
Backwoods Home magazine
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No 43
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practical ideas for self reliant living
INDEPENDENT ENERGY ISSUE
INCLUDING STEAM POWER, GROUND SOURCE HEAT PUMP, PHOTOVOLTAICS, TANKLESS WATER HEATER, DIESEL GENERATORS, SOLAR HOT WATER, FUEL STORAGE, FIREWOOD
plus
Better health from common plants
Homemade fire truck
Teaching women to shoot
Hearty salad dishes
Old World culinary delights
DON CHILDERS

My view

Start your own newspaper

For some time now, I've been thinking of starting my own newspaper. Not because I want to run a newspaper (I've got enough to do running this magazine), but to show conservatives and libertarians like myself how they can change the way today's liberally-biased mass media reports the news. It has been long obvious to me that the mass media in America has become a de facto arm of the liberal wing of the Democratic Party.

After the media played such an important role in reelectnig Bill Clinton, ignoring third party candidates, and generally misleading Americans about the issues in the election, I listened in mocking disbelief as one newscasster after another interpreted the reelection of Clinton as an endorsement of the direction in which he had been taking the country. Rather, his reelection was a rejection by conservatives of Bob Dole, and a reaffirmation, via their reelection, of those young conservative Republicans who took control of Congress in 1994. But you'll never hear that from the mass media.

I'm tired of trying to scold the media into reporting the truth. Instead I'm going to launch my own local newspaper as an example of how ordinary people can take control of the mass media at the grass roots level. We'll use it as an example that hopefully will spread across the nation. Starting your own newspaper isn't difficult to do, especially in this age of computers. I'll show you how it can be done, starting with this column.

Recruiting reporters

Many people wonder how the mass media ended up being 85% liberal. That percentage, by the way, is by their own admission. My educated guess, being a former member of the news establishment myself, is that the figure is closer to 95%. There are several reasons for this, but I'll list just consider one major one becaue it drives almost everything else.

The news arena is a mecca for would be do-gooders, for people who want to save the world and impose their vision of what's right on everyone else. Most of those people come out of colleges, and every year colleges graduate enough journalism majors to replace every working journalist in the country. So when a newspaper hires a reporter, the huge heaps of resumes editors sift through are almost all those of young liberal idealists eager to right what they see as society's wrongs. The homeless must be sheltered, the poor fed, the high and mighty brought low, and the disadvantaged raised up. These young journalists are like evangelists, eager to jump straight from their cradle of ignorance onto the world stage. They have no desire to stop and try to learn how the real world operates, nor do they have time to study history and try to learn its lessons. They are a vast swarm of do-gooders on a mission.

Not only does this oppressive heap of resumes guarantee an inordinantly high percentage of liberal reporters in the mass media, but it has another depressing effect: it depresses salaries in the newspaper business, driving out older reporters who are forced to seek higher paying jobs to support growing families. So the liberal college journalists who probably got a bit more conservative as they matured are usually forced out of the business due to their own economic needs.

In the newspaper I will start, we won't draw our reporters from this liberal pool. Instead we'll do exactly as we do at *Backwoods Home Magazine*, namely draw writers from the population at large. This has many beneficial effects:

We'll recruit people who are living in the real world—the world of business, engineering, farming, etc—not the insular world of the newsroom. That will give us people who know what they are talking about, people who have knowledge of how the world really works, rather than the knowledge that fills a young liberal's head about how they would like the world to work.

But that brings up a critical question: These people in the real world are already making a much better living than most news reporters, so why would they want to become news reporters? The answer: they won't, but they **would** be willing to contribute an occasional article related to their field of expertise. That, in a nutshell, has been the secret of *Backwoods Home Magazine*. For the eight years of our existence we have drawn our articles out of people living in the real world, not the world of journalists and writers. We have long realized that it is knowledge, not clever writing, that people want, and that older experienced people have knowledge where younger, less experienced people have lots of energy.

Running a newspaper is not unlike running this magazine. In fact, it is much easier. At *Backwoods Home Magazine*, we require a fairly sophisticated form of writing for alot of the articles we print, but the newspaper requires what is known in the journalism trade as "inverted pyramid" writing. It involves putting the salient facts first, than adding on the less important facts in paragraphs that can be easily cut, from the bottom up, as an editor deems necessary to fit each article into the space alloted him.

And just as we help our knowledgeable writers write for this magazine, we'll help others write for our pilot newpaper. I'll share our success with you in future columns. Δ

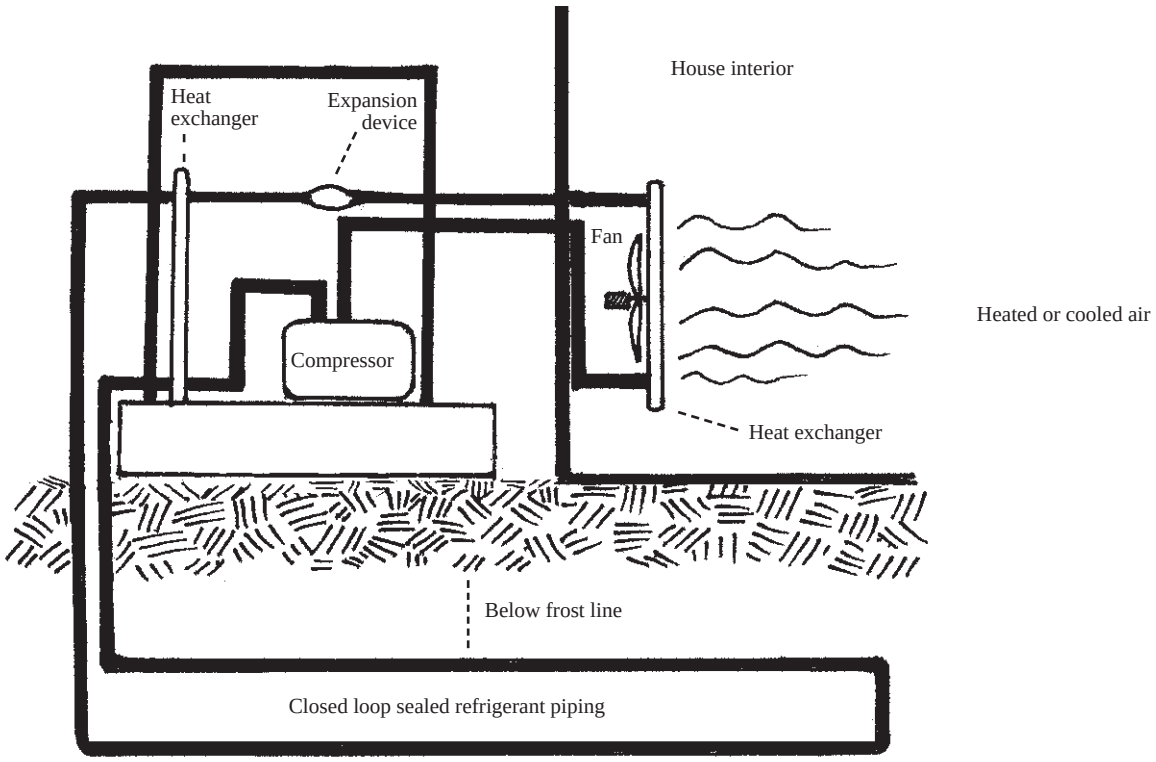
Heat and cool inexpensively with a ground source heat pump

By B.B. Bunting and Don Fallick

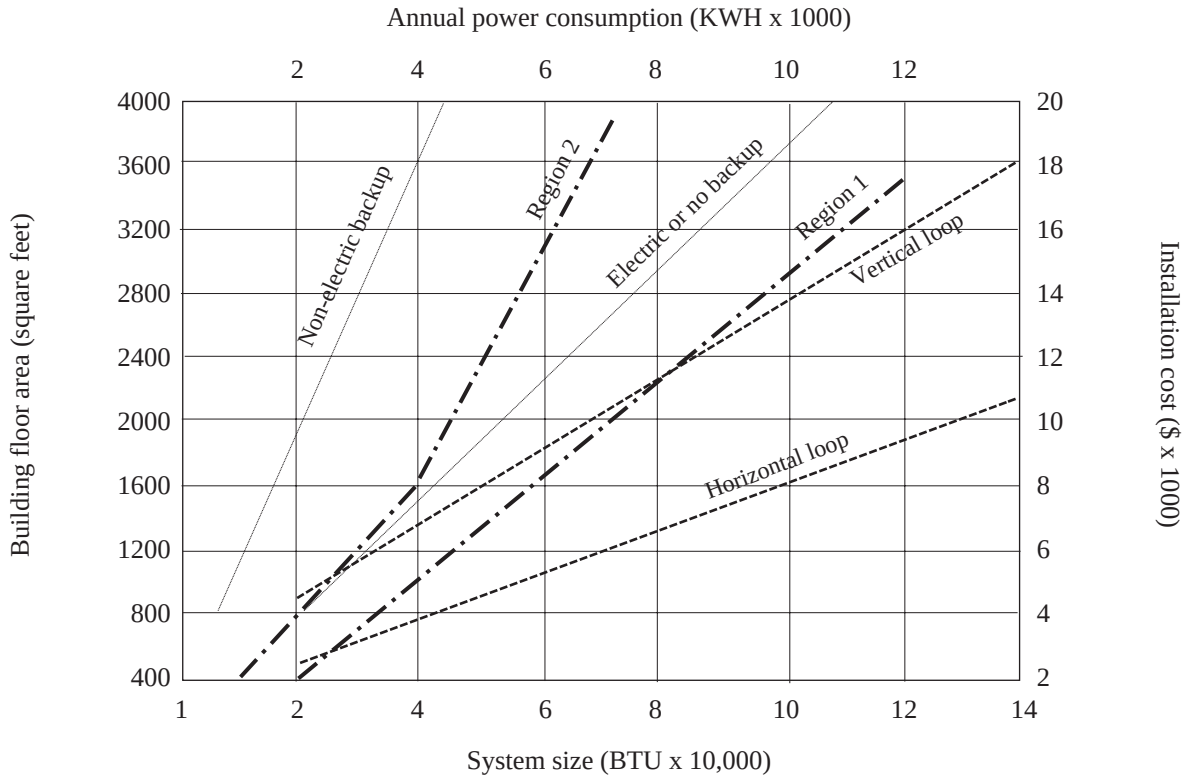
A few feet beneath the ground, just below the frost level, the earth maintains a constant temperature of about 50 to 60° F year-round. A heat pump can tap this reservoir of constant temperature to heat your house in the winter and cool it in the summer. Heat can be concentrated to provide domestic hot water as well, with minimal use of electricity, no pollution, no air-conditioner, no furnace, and no other fuel. It sounds like magic, but the technology is both available and affordable in the form of a ground source heat pump (GSHP).

The heart of a GSHP system is a pump which circulates a refrigerant solution through long pipes buried in the ground below the water table. The pipes are completely sealed, so the refrigerant never contacts the environment, but it can still pick up heat from the moist earth. Heat from the soil causes the low pressure refrigerant to vaporize. Above ground, a compressor concentrates the heat, raising the fluid temperature high enough to heat domestic hot water, and to heat the house through a heat exchanger and standard central heating system. The fluid then is allowed to cool and expand to its original density, ready for another trip underground. Because the system removes heat from the ground and pumps it into the house, it is commonly called a heat pump. But that's not all it can do.

In summer the pump runs in reverse. Refrigerant heated by a heat exchanger in the house is pumped into the ground, where it transfers its heat to the cooler earth and returns, in effect pumping "cool" into the house. The same pump can transfer heat in either direction, so there is no need for separate water heater, furnace, and cooler. The whole system consists of only the underground pipe, heat exchangers, compressor, pump, expansion chamber, and a hot water tank. Its simplicity makes it much more reliable than most central air conditioners, and much cheaper to operate than even the most efficient furnace.



Components of a GSHP. Underground piping may be vertical in a borehole, horizontal in a narrow trench, or in the form of a continuous coil in a wide trench. Piping may be above or below the water table. Compressor and expander can be in the building being served or in a shelter outside.



TO FIGURE APPROXIMATE SYSTEM COSTS

1. Determine your region. Region 1 is temperate areas, Region 2 is areas with temperature extremes. Also determine whether you will have a vertical or horizontal loop, and the type of backup heating system you will have, if any.
2. From building size at left of chart, read right to proper region line, then vertically to intersect the vertical or horizontal loop line, as appropriate. Read installation cost at right.
3. From building size at left of chart, read right to appropriate backup system line, then up to annual power consumption. Multiply this figure by your local power company's charge per KWH to find annual operating cost.
4. From intersection of building size and region line found in #1, read vertically down to heat pump size at bottom of chart. Compare to operating and installation costs of non-electric heating systems of same BTU rating.

Design considerations

A GSHP system may cost as much as $2000 more than an equivalent conventional heating/cooling system. Costs for a typical 2000 square foot house will vary, depending on soil type and moisture content and other design considerations, but might average about $6000 to $8000. This figure can be reduced by a third or more if the homeowner does his own excavation. But GSHP's great benefit is that it requires no fuel at all to operate—just the electricity needed to run the pump and compressor, which is approximately the same amount of electricity you'd use to run a standard hot-air furnace. If your heating and hot water systems use $500 worth of fuel per year, for example, it would take only four heating seasons to recoup the higher installation price. After that, there would be a savings of $500 or more in operating costs every year. GSHP systems must be buried deep, and are built to last, so the savings normally continue for the life of the building.

One problem with GSHP systems is the great length of the required underground loop. The typical house mentioned above requires a total loop length of 200 to 400 feet, depending on soil, pipe material, and the particular refrigerant solution used. The pipe should be buried below the water table, with a one-foot minimum radius around each pipe, to allow for transfer of heat. The hole can be horizontal or vertical, and the loop can be divided into several shorter "parallel" loops to reduce costs. Horizontal trenches are cheaper to dig than vertical holes, so

trenches are usually preferred where there is room, as long as the proper soil conditions can be obtained. Dry soil does not transfer heat readily, so the wetter the soil, the better. If necessary, water can be pumped into the hole or trench to moisten dry soil. But the soil must be well below the frost line. If the solution freezes, the pump will self-destruct trying to move it.

Different refrigerants require different length loops. Potassium acetate or potassium carbonate solutions require the shortest loops, but alcohol solutions, glycol solutions, and even salt solutions can work. Proprietary (brand name) solutions of potassium acetate or carbonate are available, but pricey. Salt solutions of sodium chloride or calcium chloride are cheap and readily available, but corrode pipes and fittings badly. Ethylene and propylene glycol mixtures have a high viscosity, making them harder to pump. Methyl, ethyl, and isopropyl alcohol solutions are better, and readily available, but don't work as well as potassium refrigerants. An engineer familiar with GSHP will be able to determine the best refrigerant for your particular needs.

A single, long ground loop is simpler to make and easier to test than a complex system of parallel loops. But long pipes must be larger in diameter to reduce pressure loss, so most systems use parallel loops. A two-foot-wide trench can contain two or more complete loops in parallel, reducing excavation costs by almost 50%. In new construction, ground loops can be located in septic system leach field trenches, using the leach field drainage to improve heat transfer. Vertical loops can be placed in well holes, either inside or outside the well casing. Vertical and horizontal loops can be mixed in a single system, if desired. It is much better to have more loop length than necessary, than to have too little, but too long means using excess pump power. Ground loop piping should be constructed of materials recommended by refrigerant manufacturers. Check with the manufacturer or a competent engineer for specifications. Sources of information are listed at the end of this article.

Systems can be designed to accommodate buildings of many different sizes, or can even be shared among multiple users. In rural Colorado, there are about 40 homes currently using GSHP. Many of them share a system among several houses, to reduce costs. In addition, The Rural Electric Association has erected a 50 foot x 100 foot shop heated only by GSHP. It uses the same size heat pump as a 4000 square foot house.

Get it right

Perhaps the best way to reduce the initial cost of a GSHP system is to do most of the work yourself. It is possible for a technically minded homeowner to do much of the design and installation himself. The design and installation guides mentioned at the end of this article are good places to go to begin thinking about a GSHP system. Because there are many factors affecting the performance of a ground source heat pump, it is imperative to get some input from a heating/cooling engineer familiar with GSHP. The actual excavation and plumbing is straightforward, for those with appropriate skills and equipment. But because the system is difficult to repair or replace once installed, an amateur should go out of his way to get help in the design and testing of the system.

High quality equipment and seam welding is an absolute must for longevity and performance. This means using pipes made of Polyethylene 3408 (Schedule 40 or SDR 11) or Polybutylene 2100 (SDR 13.5 or SDR 17). GSHP also requires a really good, well-made, rotary type compressor. These can cost $350 to $700, depending on the size needed, or even more with built-in thermostatic controls. A large compressor with a two-way "flop valve" for reversing the pump direction automatically could run as high as $1000, so it pays to get knowledgeable advice before building. Sources of such help are listed at the end of this article.

Not all such help costs money. For information on your local soil, its moisture content, frost level, and constant temperature level, see your local U.S. Soil Conservation Service engineer, especially if you are considering a horizontal loop system. For vertical loop systems, your U.S. Geological Survey agent would be more helpful.

A GSHP may seem like an expensive option, but it has several advantages, besides using no fuel. Heat pumps are completely sealed, so they pose no environmental threat whatever, aside from the electricity they use. In an active heating/cooling system, where electricity is going to be used to move the heat around anyway, the additional power consumption is minimal. Even this can be reduced, though, by the use of a non-electric backup heat source, such as firewood, passive solar, etc., during the periods of greatest demand.

For more information:

Manual H, Heat Pump Systems: Principles and Applications**,** Air Conditioning Contractors of America, 1513 16th St. NW, Washington, D.C.

Closed-Loop/Ground Source Heat Pump Systems-Installation Guide, International Ground Source Heat Pump Association, PO Box 1688, Stillwater, OK 74076-1688

Directory of Certified Air-Conditioning Products, Air Conditioning and Refrigeration Institute, Vice President, Engineering, 4301 North Fairfax Drive, Suite 425, Arlington, VA 22203

Check with local heating/air conditioning engineers, or contact B.B. Bunting, 708 N. Fourth St., Sterling, CO 80751, who provided much of the drawings for this article. Δ

Tankless water heaters offer some important advantages, but they have some drawbacks, too

By Greg Guiltner

Should we buy a tankless hot water heater? That's the question my wife Vicki and I faced in 1981, when we began to plan our own superinsulated house. We were looking for the most efficient choices in everything from lighting to windows. Since water heating accounts for about 20% of home energy use, we really wanted to make sure we made the right choice. Advertisements for tankless hot water heaters, also called *demand-use* or *instantaneous* heaters, were appearing in many magazines at the time. For several reasons (which I'll explain later) we took the plunge and bought an Aquastar tankless heater. At the time, we knew of no one who owned one of these heaters and in fact had never even seen one. If you wonder if we made the right choice or if a tankless heater might be right for you, read on. Perhaps our experience over the last ten years can help you decide.

Why tankless?

While planning to build our house, I approached my friendly former banker about a building loan. He showed his keen interest in the project by laughing in my face. Though I never even finished completing the loan application, the bank further demonstrated their enthusiasm by mailing out a written rejection: No building experience, no credit history, no collateral, no loan. As a result, we decided to scale back and try to build on a cash-and-carry basis, using meager savings and income from my job as we progressed. Our goal changed from building the house we would live in forever, to building a small superinsulated house that would be low-cost to build and live in and easy to sell later. We would use this house as our testing ground to discover what worked for us and what features to incorporate in our dream home later.

The first advertisements I saw for tankless hot water heaters mostly promoted their ability to provide endless hot water. The ads typically showed a large family with Mom, Dad, and a bunch of kids in their bathrobes, right after they'd all taken showers, one right after the other. "Who needs that?" I thought. "We don't even have any kids."

But later, when several energy-related magazines did reviews comparing the energy-saving features of these heaters, I began to take notice. We sent for information from several companies. The literature we received confirmed that there was a drawback: these heaters were not cheap. They cost about three times what a mid-range hot water tank cost.

The up-side was, the heater we picked was supposed to save 20-50% of the cost of heating water. If this panned out, payback would come well within the time frame that we expected to remain in the house. Still, that was a lot of money for us. I cringed as I mailed the check, sincerely hoping the expected savings appeared. Vicki encouraged me by saying, "Well, if it doesn't work, we'll know what not to get next time."

Is your hot water heater smaller than a four-year-old? Benjamin Guiltner shows how this Aquastar measures up. The model shown in the photo is one of the largest tankless heaters available.

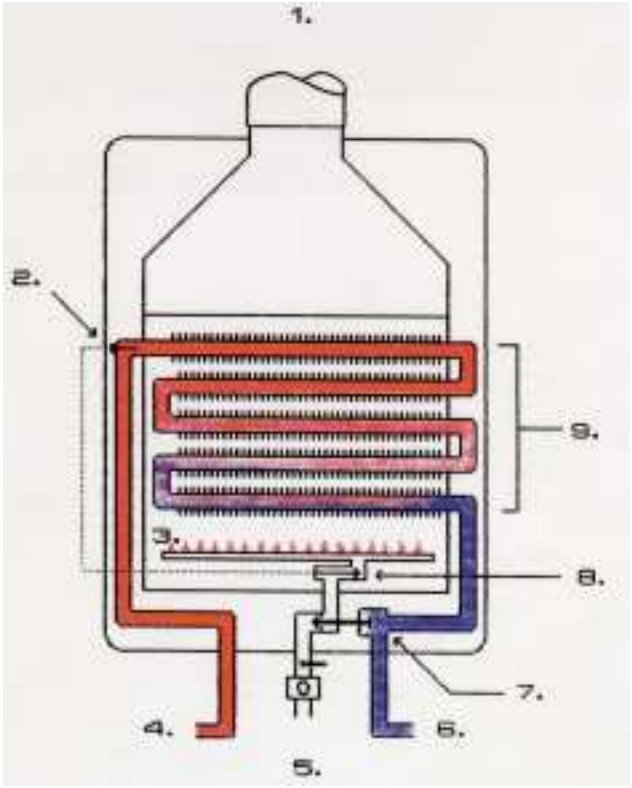
How they work

If you have a conventional hot water tank, you've probably never had anyone ask, "What's that thing?" At our house, visitors often ask just that. Tankless water heaters don't look anything like their conventional cousins, and they work differently, too. As the name implies, they have no tank and store no hot water. As a result, they are much smaller—about the size of a suitcase. Also, they hang on the wall, taking up no floor space whatsoever. If you're as squeezed for space as we were, this can be a real benefit. We were able to put our water softener on the floor space that

would have been occupied by a conventional hot water tank.

Tankless water heaters are available in propane and natural gas models. There are also electric models, but these aren't energy conservers. The gas heaters have a pilot light, just like a regular hot water tank, but the burner never comes on until someone uses hot water. Water flow causes the heater to open the gas valve to the burner. Water is heated as it flows through a heat exchanger. The exchanger is nothing more than copper tubing that loops back and forth above the burner. Heat fins on the tubing increase the surface area and therefore the heating efficiency.

A conventional hot water tank heats water like a pan on the stove, only this pan is four or five feet high. A tankless exchanger is much more efficient than this. Better heat transfer is where some of the energy savings are accomplished. The rest of the savings come from the absence of any stand-by heat loss. No matter how well a regular hot water tank is insulated, some heat is lost through the walls of the tank, especially through the uninsulated flue, which passes through the center of the tank. On a tankless unit, more of the heat produced from the burner is actually delivered to the tap.



(1) Gas vent [flue]. (2) Thermostat sensor. (3) Burner. (4) Hot water outlet. (5) Gas pressure regulator. (6) Cold water inlet. (7) Gas flow valve [water controlled]. (8) Gas flow modulator [temperature controlled]. (9) Heat exchanger.

Modulating burners

That's about all there is to some tankless heaters. The better heaters also have a modulating burner. On these heaters, a thermostatic sensor measures the temperature of the water exiting the heater, and adjusts the gas flow to the burner accordingly. Modulating heaters will continuously provide the precise temperature you have set them for, over a certain flow range. If you exceed this maximum flow, the water exiting the heater will be cooler than the temperature you set it for. Assuming a 60° temperature rise, maximum flows range from around one gallon per minute on the smaller heaters, to about 4.4 gpm on the largest heaters.

The heater we bought had a modulating burner. I wouldn't recommend those that don't, though they are cheaper. With non-modulating units, the temperature of the water varies whenever the flow rate changes. You may eventually get used to this, but you might need to give visitors an instruction manual. Most people are accustomed to increasing the hot water flow when they want hotter water. On a non-modulating heater, this will actually *decrease* the temperature, since the water flows through the exchanger faster. Conversely, when someone turns the water flow down low, the temperature can become scalding hot. Also, when running water at very low flow rates, the high temperatures produced tend to cook any hardness in the water onto the inside of the heat exchanger tubes, reducing their efficiency.

Installation

Our heater was delivered in an impossibly small box. I'd seen the photos in brochures and magazines, but seeing this little box sitting in the middle of the living room floor brought home just how small these things really are. If you've ever wrestled a regular hot water tank into place, installing a tankless water heater is going to be a real delight.

First you'll want to carefully consider where to put your heater. You must pick a place where it will not freeze. Remember, tankless heaters store no hot water. The meager pilot light is not enough to save your heater or your plumbing. The fact that you can put a regular hot water tank in a small, unheated space and have it maintain enough heat to preserve the tank and piping to it, should tell you something about where part of your energy dollars are going.

Hanging the heater is simple. My Aquastar came with a heat shield mounted on two wall brackets that screw onto the wall. The brackets were designed 16" apart to fit normal stud spacing. The heater itself then slid over the wall brackets. After the heater was hung, all that was left was connecting the water and gas lines and the flue. The front and sides of my heater had to be removed to provide easier access for these connections.

Connecting the water lines was just like on any water heater, except that the inlet and outlets are at the bottom of the heater, rather than on top. One difference: there is no place on the heater to put a temperature/pressure relief valve. This doesn't mean you don't need one. You have to install a T fitting in the plumbing at the hot water outlet to provide a place to mount the relief valve.

When you're ready to connect the vent, you'll find that a tankless unit will require a larger vent than a conventional water heater. This was no problem on my new installation. However, if you are replacing an old hot water tank, you'll have to make some changes. Conventional hot water tanks use small 3" vents. All propane or natural gas tankless heaters will need a bigger vent than this. Ours used a 5" vent. You definitely don't want to just put in a reducer. The reason standard hot water tanks use such small vents is because they burn slowly over a protracted length of time, to heat or reheat the water in the tank. The burner on a tankless heater, however, is only on for a short time, while you are using water. It must heat the water quickly as it passes through. As a result, when you are using a lot of hot water, gas is burned at a faster rate, but for a much shorter time. You need that bigger vent to keep up with the increased burn rate on the tankless heaters. Since the vent is so close to the wall, we used a type "B" gas vent. This double-walled vent can be used with as little as 1" clearance from combustibles.

Just as the vent pipe was larger, the gas supply piping must be larger. The supply pipe on our Aquastar was 3/4", rather than the 1/2" typically used with a hot water tank. Other than the pipe size, the only difference in connecting the gas piping was that a pressure regulator (included with the heater) goes just before the heater. The regulator had 3/4" female connections at the inlet and outlet, so installing it required a 3/4" nipple between the heater and the regulator.

Trying it out

At last we were ready to try out this expensive device. Lighting the pilot on one of these heaters is almost exactly like lighting a conventional heater. Turn the burner knob to the "pilot" position and hold in the button until the pilot is lit. Our heater had a convenient piezo igniter, like what you'd find on a gas grill. Just push the button, and the igniter throws a tiny spark that lights the pilot. Lighting it the first time took a bit longer, since all the air had to purge from the gas piping before it would stay lit. After the pilot is lit, you turn the burner knob to the "burner" position.

While our first hot water at the new house may not have rated up there with the first flush, it was at least a close second. I sent my dad, who was at the house helping me install the heater, to open a water faucet. As soon as he did, the burner popped to life, sounding much like a gas furnace coming on. In seconds, hot water was flowing out the faucet in the bathroom. When he turned up the water flow, the burner flame grew bigger, maintaining a constant temperature. When he cut back the flow of water, the flames cut back. The temperature on the outside of the heater cabinet remained surprisingly low, getting warm only on top. When he shut the water off completely, the burner instantly went out. I was ready to say "WOW" backwards. I won't own up to how many times I turned the water on and off just to watch that burner start and stop. It's enough to say that I didn't accomplish much the rest of the day.

In this photo, the front and combustion chamber panels are removed to show the burner and heat exchanger.

Dollars & sense

My family has lived with a tankless water heater for over a decade now. Do they live up to all their promises? Do they provide endless hot water? Do they cost 20-50% less to use than a conventional heater? The answer is Yes . . . with a few caveats.

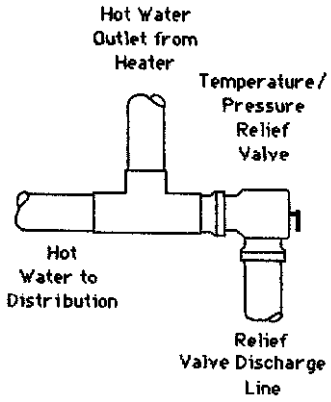
Tankless heaters do provide an endless flow of hot water, but at a lower flow rate than most people are accustomed to. With the low-flow

shower heads we were using anyway, this was not a problem. We did have to cut back the cold water valve going to our clothes washer, to prevent it from mixing in too much cold water, due to the lower flow rate. On the other hand, at the time we moved into our house, we had a water bed. We were able to fill the mattress completely with warm water, without pause, so we could sleep in it that same night. You'll have a bit less flow, but you can have that flow for as long as you like.

No big lifestyle changes, but how about the energy claims? Here's how we came out. The first full year we used the tankless heater, we saved 35% in hot water costs over the cost of using the fairly new hot water tank we had before we moved. Before you get too excited, note that this was an average savings of only $6.50 a month. This is not big potatoes, but it does add up to annual savings of $78. Unfortunately, we spent about $560 for this heater, $380 more than for a mid-range conventional hot water tank. This means it took almost five years to pay back the difference in cost with energy savings from the tankless heater. After that, the $78 savings was just that, savings. That may or may not seem like much to you, but when's the last time you threw four $20 bills into your wood stove, just to heat your house for a short time? If you still have a conventional hot water tank, that's almost what you're doing . . . throwing away money for a negligible short-term benefit.

Would we buy another tankless heater? After living inexpensively in our little superinsulated house for eight years, we wanted a bit more room and more land, further out in the country. We bought five acres, and in the spring of 1993, we started building the house where we live now. We incorporated everything we liked about the first house, and yes, we installed a tankless water heater. The surprise came when we discovered that these heaters have remained about the same price as they were ten years ago. With increased propane and natural gas costs, your fuel savings may be even greater today.

This time around we bought one of the bigger Aquastar models that have since become available. The smaller heater we had before would have been fine, but for one small fact: after 15 years of marriage, we've accumulated seven children. With the old heater, if two people tried to use hot water at once, we would exceed the maximum flow the heater was capable of. With a large household like ours, this was happening more and more frequently.



To install a temperature/pressure relief valve on a tankless hot water heater, use a T *fitting in the hot water outlet line as shown.*

The larger heater has enough capacity to use hot water at two different points without exceeding the maximum flow.

Although the larger heater has more capacity, the energy savings are still there. Buying a bigger tankless heater is not like buying a bigger hot water tank. The larger unit does not use more energy at all times. The modulating burner only burns at whatever rate is needed to raise the water to the desired temperature. The only time the extra burner capacity is used is when two people are using hot water at once.

Longevity

This extra convenience didn't come without a cost. While the first tankless heater was expensive, this one cost both arms and both legs. Payback, counting energy savings alone, would be on the order of nine or ten years. While this may seem like a long time, there's something else to consider. The main component that fails on a conventional hot water tank is the tank itself. There's no reason to believe that a tankless heater won't last the lifetime of your home. The two tankless water heaters we've bought both had stainless steel burners. The copper heat exchangers had ten-year warranties. We never had to do a thing to our first heater, and it's over ten years old and still working like new. If necessary, heat exchangers, burners, and other parts are all replaceable. Try replacing just the tank on your regular hot water heater. If you add in the cost of replacing an ordinary hot water tank every eight years or so, the payback on a tankless heater suddenly looks considerably better.

Obviously we're sold on using a tankless water heater. There are a few drawbacks however. For one thing, you'll probably have to buy mail order. We bought our first heater directly from the manufacturer. Our latest heater came from Kansas Wind Power. (They advertise in *BHM*.) Buying mail order means a wait for parts, if you ever need them.

Another problem may be resisting the temptation to use more hot water. With a conventional hot water tank, when the hot water runs out, I guarantee you, whoever's in the shower is coming out. With a tankless heater, the hot water never runs out. At our house, "shut off that water" has joined the frequent petition of "shut off the lights." It takes discipline not to use more hot water just because it's there. The cost savings are available, but it's still up to you to make them real. Δ

Rough day? You need to sip some yeller wine

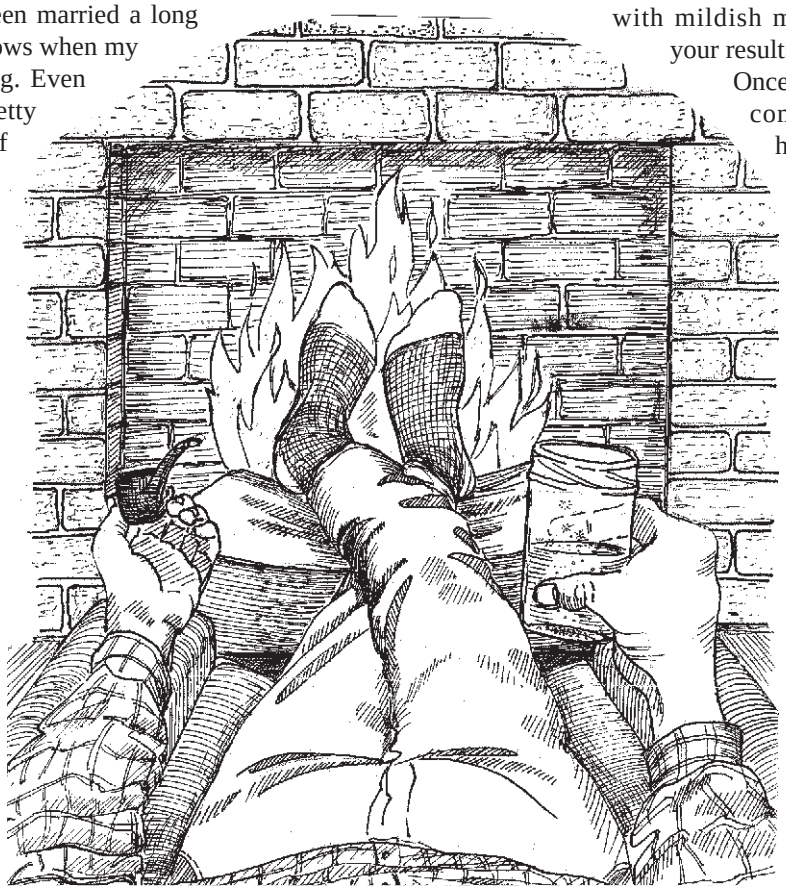
By Rev. J.D. Hooker

Today has really been a rough one. Seems that one of my daughter's spotted squirrel dogs got under the house yesterday and ripped up most of the insulation. So, of course, most of our water lines froze and burst sometime last night. This morning I shut down the well pump and made up a list of plumbing supplies I'd need, then drove in to town.

You probably already know that when your morning starts out like this, things generally just keep getting worse. So you won't be surprised to hear that my old Dodge pickup snapped a U-joint on the way home. Or that the day warmed up during the time I spent fixing my truck, so I ended up crawling around in the mud under the house, replacing pipes and fittings.

I did finally manage to get everything all put back together and working right, finishing up just after dark. So finally, with all of the grease and mud showered off, clean, dry, and tired, I kicked back by the fire, stuffed my old briar with homegrown tobacco, and started to relax a little. That's when things really improved.

My wife and I have been married a long time, and by now she knows when my spirits need a little lifting. Even though it had been a pretty bad day, the first sight of the Mason jar, full of bright yellow summer sunshine, really brightened up my evening. That cool, sparkling, yellow, watermelon wine went down just perfect. I decided that the day was not all that bad after all, when it ended like this.



Then I thought about all of the poor folks who have never tasted this terrific yeller wine, and I decided to sit down and get this typed up, so I could get it in the mail to *Backwoods Home* in the morning. So here's the way I learned to make yeller wine. It does take a little time, but it's a really simple process, and more than worth the time invested.

To start with, you're going to need to grow yourself a good supply of yellow-meated watermelons. Yellow melons seem to have been around longer than the red type, but aren't nearly as popular with commercial growers. They aren't something you can just walk in to the supermarket and buy. I've had my best results using any of these three varieties: Desert King (available from most mail order seed catalogs), Navajo Yellow Melon, and Hopi Yellow Watermelon (both available from Native Seeds SEARCH, 2509 N. Campbell Ave. #325, Tucson, AZ 85719).

In the South, you can plant these seeds directly in the ground in early spring. North of the Mason/Dixon line, you'll need to start the seeds indoors, about a month before the last frost date, and transplant them into your garden after the soil has warmed up.

If you only allow the first two melons on each vine to grow, you'll end up with larger and sweeter fruits to work with. Just keep pinching off all the other flowers so that each plant puts all of its reproductive energies into just the two fruits. Feeding the vines once or twice a week with mildish manure tea will improve your results quite a bit.

Once the melons have ripened completely, you'll need to harvest them and remove the yellow juice. I just halve the melons and scoop out the sun-colored fruit. Then I run the fruit through the hand-cranked juicer my wife uses for making tomato sauce, jellies, and such. I save all of the seeds, some for next year's planting and some to give away. A regular cider press, or any other method for extracting the juice, would work just as well.

Since watermelons never seem to ripen perfectly all at once, I usually make this up in 4 1/2-gallon batches. Once you've got about

4 1/2 gallons of juice, sample it to check for sweetness. You'll want the sweetness to just about equal regular grape juice, and you may need to stir in a cup or so of regular white sugar to sweeten it just a touch.

I usually use a five-gallon ceramic crock for a container, as its heavyish lid seems to work perfectly as an imitation airlock, letting fermentation gases escape, but keeping mold spores and such out. A five-gallon plastic bucket, with its lid just laid on top and weighted with a brick, seems to work equally well. Anyway, put your juice into the container you'll be using, and stir in a half packet of regular baking yeast.

After a couple of days you'll be able to see bubbles rising to the surface of your now-fermenting juice. After a week or two (or even three or four, depending on the temperature), this fermentation will ease off, and then stop completely. Once the fermentation has quit, you'll need to siphon the wine off into a clean container, being very careful not to stir up the sediment on the bottom. Now add three cups of white sugar for every four or five gallons of wine, and another half packet of yeast. In a day or so, your wine will begin to ferment again.

You need to check this second fermentation daily. Once the violent fermentation has eased up, but while the wine is still really bubbly, it's time to siphon it off into canning jars. I wouldn't recommend trying any other sort of jars or bottles, but regular canning jars seem to hold the champagne-like pressure just fine. Use new lids, and screw them on quite tightly, then store in a coolish dark place.

This wine doesn't seem to keep very well, maybe three years tops. But it is delicious. So share, whether it's a good day or bad, 100° August afternoon or sub-zero January evening, and especially with good friends. This bright, bubbly, sun-colored, yeller wine is a for-sure spirit lifter. Go ahead and try this one yourself. I'm certain you'll be happy you did. Δ

Is steam power in your future?

By Skip Goebel

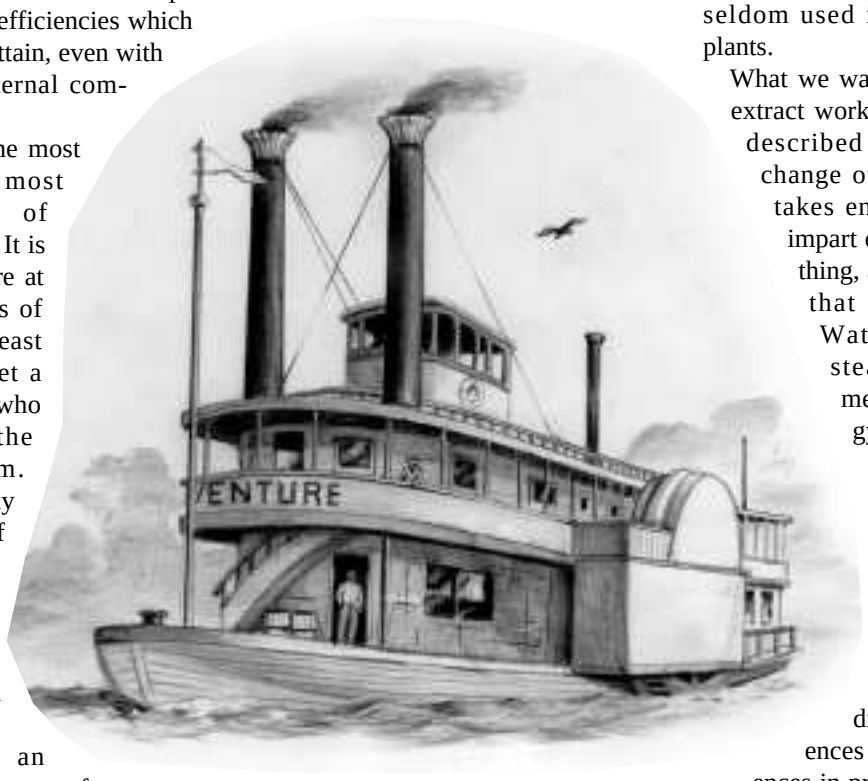
If you're thinking steam is old-fashioned, consider this: Almost a century ago, steam cars and ships attained speeds and efficiencies which are still difficult to attain, even with today's modern internal combustion engines.

Steam is one of the most powerful and the most dangerous forms of independent energy. It is so powerful that here at Tiny Power, makers of steam engines, at least once a week we get a call from someone who is going to save the world with steam. Usually, it takes only a few minutes of conversation to reveal that the caller needs more education in the basics of steam engineering.

This article is an attempt to answer some of the many questions people have about steam. And I guess the first question is: can it save the world, at least as far as your personal energy needs are concerned? That depends.

For the initial investment in this most labor intensive form of home power, you could probably buy a diesel generator and 5-10 thousand gallons of fuel with no significant changes in your lifestyle. If you plan to burn wood, you should know that it is a very established science to gasify wood and burn it in an internal combustion engine. This may be a more practical application for you.

If you have a need for large quantities of controllable heat, say to heat a large home, chicken house, or even a kiln, steam plants excel in that the waste heat (exhaust) of a steam engine will give you excessive amounts of BTUs to play with.



What is steam?

What is steam? "Water gone crazy with the heat" is as good an answer as any. Water will actually turn into steam in a vacuum if its temperature maintains 40 degrees F. Conversely, at a pressure of 3200 lbs. per square inch, and a temperature around 720 degrees, steam becomes "supercritical" and actually has a density the same as water. Modern steam systems run at these pressures because steam, which is a 'super-radiant' gas, absorbs and gives up heat much faster than water.

Only "dry" steam produces usable work. Steam is a dry, clear, tasteless gas. The cloudy stuff you can see coming out of a kettle is actually just water vapor and has no use for our needs because if you can see it, all the work has gone out of it.

Once water is turned to steam, you can raise the temperature of the gas and store more energy/work in it. We call this "superheated" steam and though it is a desirable condition, it is seldom used in small-scale steam plants.

What we want to do with steam is extract work from it. Work is best described as the movement or change of velocity of mass. It takes energy to do work. To impart energy to a mass is one thing, and to transmit and use that energy is another. Water, in the form of steam, is an excellent medium to transmit energy.

Water is a practical, safe and effective non-organic chemical that will readily absorb and transmit energy. To understand how this happens, try to think in differentials, i.e., differences in temperature, differences in pressure, or more specifically, differences in volume. As steam goes from one volume to another, work is done. An example of this is a piston going down in a cylinder creating more space or volume (expansion). As volumetric changes occur, temperature and pressure changes must also occur. These are laws of nature that you cannot change. We have units to measure the properties of mass. Generally, pressure is measured in pounds per square inch, volume in cubic feet, and temperature in degrees Fahrenheit. (I ain't metric yet, folks.)

At this point, let me introduce you to the British thermal unit (Btu). It's the United States unit of measure, which is similar to the metric system's calorie. It is nothing but a unit of heat. One Btu is the amount of heat

required to raise one pound of water one degree Fahrenheit. Conversely, if a pound of water drops one degree, it releases one Btu.

When any fuel is burned, it gives off energy in the form of heat, and that heat can be measured in either Btu's or calories. We'll use Btu's. An example is oak wood, which has 6-11 thousand Btu's per pound. Consider it as potential energy or energy waiting to happen. When oxidized (burned), it releases energy, and if we make steam with that energy, we can use the steam to transmit that energy somewhere else to do useful work.

Other sources of Btu's can be a hot spring or solar. Remember, what we are looking for is a difference in temperatures; the higher we can raise the temperature of water, the more work we can get out of the water. Unfortunately, the less the difference in temperature is, the greater the volume of water must be. For example, one pound of steam at 800 degrees has a certain amount of work in it; to produce the same amount of work at 400 degrees, you need a much greater amount of water.

So, we take one pound of water from 60 to 212 degrees and it takes 152 Btu's. (212 - 60 = 152) Now we add one more Btu and it all turns to steam at atmospheric pressure. Right? Wrong!

Raising water temperature is easy; changing water to steam is a whole 'nother ballgame. It takes a lot of energy to change the physical state of matter. Remember, it is not wasted here; rather it is stored.

To convert one pound of water from 212 degrees water to 212 degree steam (still one pound by weight) at atmospheric pressure takes another 970 Btu's. If we contain all of this, as in a boiler, we get a pressure differential (inside vs. outside). That pound of water, at 212 degrees, had occupied only .2 cubic feet. The steam at 212 degrees and at atmospheric pressure (or 14.7 lbs. per square inch) will occupy 27 cubic feet.

Now, if that steam isn't allowed to expand into those volumes because it is contained, we get an increase in pressure. It is this pressure that we will use to do our work.

What type of boiler?

The container in which we will make our steam is called a boiler. There are basically three types of boilers.

The Fire Tube boiler. This is the oldest, simplest, and the one that creates the steadiest production of steam. It is also the most dangerous (tends to blow up). Therefore, no more on this one. Forget it, nada, noway, etc. Paste this sticker on your brain: ***There is a stick of dynamite in a gallon of water.***

The Water Tube. This is more efficient, safer, common, easy to build, etc. Basically, the design incorporates a series of tubes that stem downward from a drum and surround the combustion chamber (firebox). Steam is then drawn off the top of the drum where it is routed to its intended use by a pipe. (See figure 1.)

A common example of these types is a home heating boiler. Big ships and power plants use these designs as well. We have one in our 23' steamboat that burns wood, and it works rather well. Let me interject here that if you burn solid fuel (wood or coal), ***you will attend your boiler at all times***. If you can't, just drop the whole idea. If you can, be prepared for perpetual bliss.

The basic layout is as illustrated in the figure. Do not, by any means, use this illustration to design your own boiler. If you had to educate yourself by reading this article, you cannot, will not, and shall not build one of these. Remember, death is final (and painful).

There are countless plans available that are approved, certified, and well tested. Steam is definitely a 'finalized' science. If you look in the yellow pages, you will find certified boilermakers who will do the job right. Technically, you are breaking the law by building a non-certified boiler.

Monotube or flash boilers. This by far is the most efficient, lightest, and safest boiler. It is easy and inexpensive to construct. They work best on continuous, steady operation. However, with little reserve capacity, they are sensitive to fluctuations in fuel and water supplies, not to mention loads. The most common versions

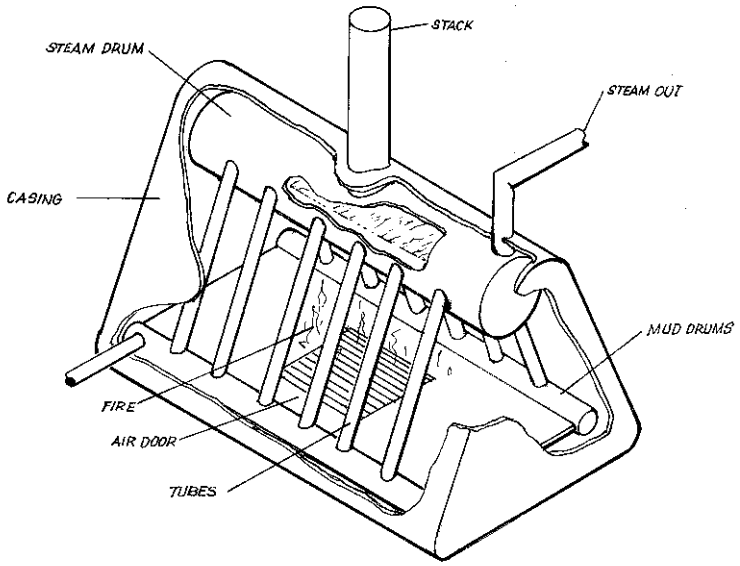
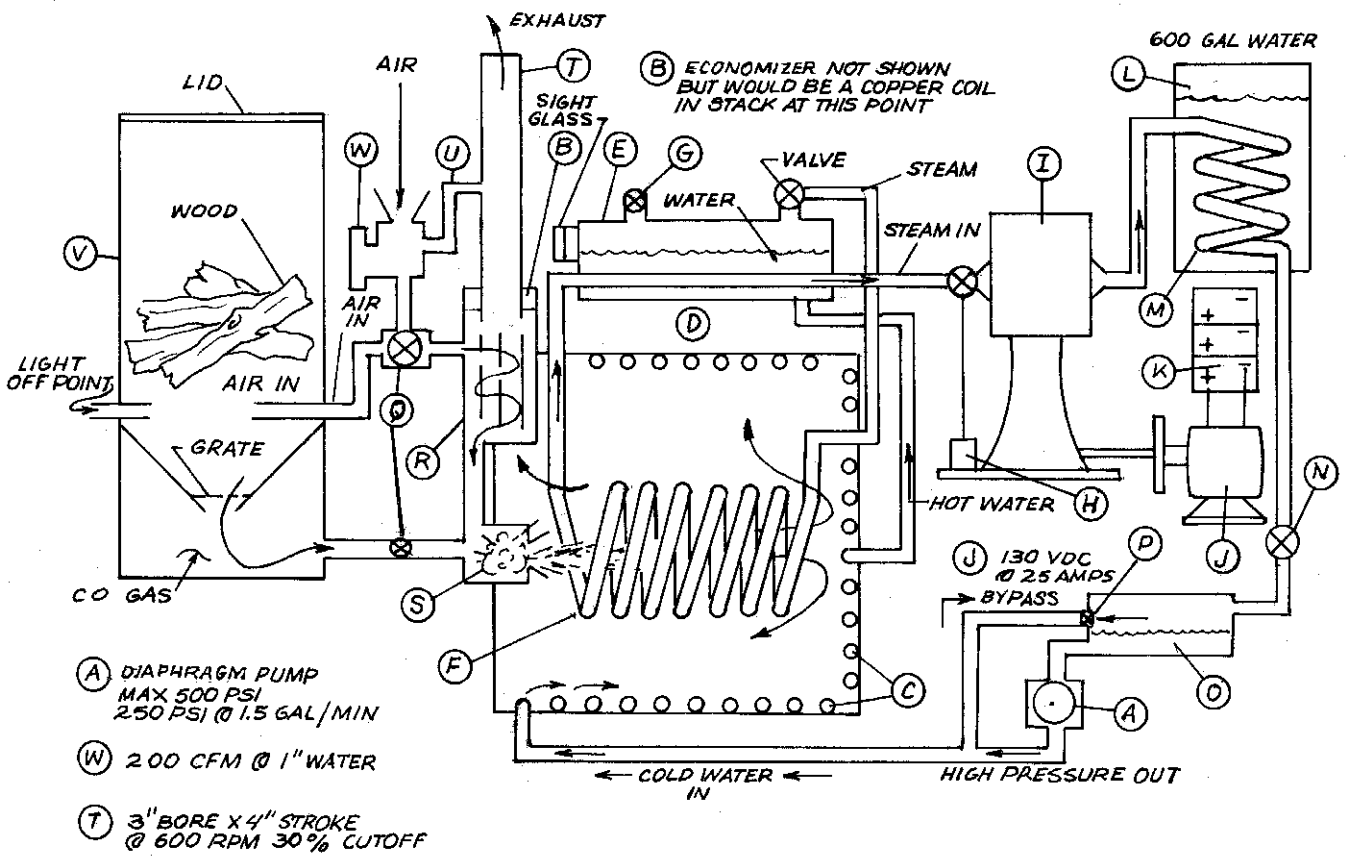


Figure 1. Water tube boiler



A. Feed pump (pumps water to boiler)
B. Economizer (picks up initial heat)
C. Outer coil (brings water to steam temperature)
D. Desuperheater (exchanges heat from superheater to the water)
E. Separator (space for water and steam to separate)
F. Inner coil or superheater (where steam will pick up massive Btu's)
G. Safety valve (set to release excessive steam pressure. Very Important!)
H. Governor (valve that regulates speed of engine)
I. Engine (where steam does its work)
J. Generator (turned by the engine to make D.C. electricity)
K. Batteries (store electricity)
L. Water tank—600 gallons (provides hot water for home and stores around 500,000 Btu's)
M. Condenser coil (where exhaust steam will give up heat and condense back to water)
N. Vacuum pump (pumps condensed steam or water back to hotwell—optional)
O. Hotwell (holds a given amount of water to be pumped to boiler)
P. Float valve—regulator (bypasses excessive water being pumped and regulates system)
Q. Pressure activated draft (controls amount of fire)
R. Air heater (preheats combustion air)
S. Combustion chamber or burner (where fuel/air mixture is burned)
T. Exhaust stack (spent gases are expelled here)
U. Exhaust gas recirculation (provides flame control)
V. Carbon monoxide generator (gasifies wood through destructive distillation)
W. Air pump (forces air through system via carbon monoxide generator and burner)

Figure 2

are portable steam cleaners. Modern motels use a variation as water heaters.

Basically, they consist of one continuous coil of tubing or pipe in various configurations. Hence the name "Monotube." If we can provide exacting control of our fuel/water supply, then we have the ideal home-power boiler. Gas and liquid type fuels are the ideal type of fuel for monotubes because they are easy to regulate. And yes, there are approved designs out there for monotubes, and a professional can build them rather cheaply.

Combustion facts

A given amount of fuel needs a given amount of air to burn—no more and no less. It also needs the right amount of space to burn. Not enough air and you get incomplete combustion. Too much air and you're heating air.

Also, if we make the air meet the fuel too quickly, we get too hot a flame. That's bad because at temperatures over 1800 degrees, the nitrogen in air and some other chemicals start to oxidize. Not only is that poisonous, but it is wasted energy.

Combustion space is important because too little and we snuff the flame. Hold a lit candle so the flame touches an ice cube and if you look real close, there is an invisible layer of gas insulating the flame from the surface. That layer is unburned gases like carbon monoxide and is caused because the surface temperature was below the ignition temperature of the burnable gases. The rule is: Flame shall not touch metal.

Also, too much space and we can lose our coefficients of radiation. Generally speaking, a boiler gets 60-70% of energy transfer from radiant energy, rather than hot gases.

The idea here is to gently unite air and fuel together and give it plenty of space or time to do its thing. There are set formulas for all of these factors, and your boiler builder will know what to do once you tell him what your needs are.

One of the small, high-quality steam engines made by the author's company, Tiny Power, Inc.

Enormous torque

Now that we have our steam, let's use it. We extract the work from steam by allowing it to expand in a controlled environment such as with a piston in a cylinder or a nozzle in a turbine.

Turbines are nice, and I have one myself, but in home scale sizes, they are very inefficient. It's just a matter of physics and costs. I know there are plenty of folks out there that will argue this point, but if they can come up with an efficient, home-scale turbine and sell it at a reasonable cost, I'll buy it.

Steam launch Santa Cruz II, *Echo Lake, California*

So, we're stuck with the piston (reciprocating) engine. Take heart. They work, they last, and they've been around for a long time. Steam engines are quiet, heavy, long lasting, and if modern, easy to maintain (our larger models use sealed ball bearings).

You can find plenty of used engines at old shipyards, refineries, ancient factories, mines, and railroads. Or you can buy a new one.

Consider steam engines akin to a fast acting hydraulic cylinder with an automatic valve. The ram is connected to a crank which turns and gives useful work. It is important to note that most steam engines are designed to take steam on both sides of the piston, which makes it a "single-stroke" engine. That also makes piston engines produce enormous torque at almost any rpm. You can figure this torque by taking the square inches of the piston, multiplying that by the average cylinder pressure, and multiplying that figure by the length of the stroke measured in feet divided by 2. An example would be: A single cylinder engine has a bore of 3 inches and a stroke of 4 inches and runs at 100 lbs of average cylinder or "mean" pressure. A three-inch piston has

A bigger steamboat

approximately 7 square inches (3 x 3 x .7854) and a stroke of .33 feet. (4/12). 7 x .33 = 2.31. Times that by 100 pounds pressure x 2.31 = 231 and divide that by 2, and you get 115.5 foot-pounds of torque. In reality, however, there are friction and efficiency losses.

Efficiencies are measured by how much steam/water an engine consumes to do a given amount of work. This is usually measured in pounds of steam/water per horsepower hour. In English, that means that for every horsepower produced for one hour, a certain amount of steam/water will pass through the engine.

Our shop unit has been in use for the last 18 years producing 4000 watts an hour. It consumes about 250 pounds of water (that has been turned to steam) in one hour. 750 watts is considered one horsepower, and when you figure efficiency losses, that works out to about 47 pounds per horsepower hour (250 lbs divided by roughly 5.3 horsepower). Put another way, for every horsepower the engine produced, we evaporated 47 pounds of water to steam and passed it through the engine.

There are engines that are much more efficient, but they cost a lot more than you want to pay. Efficiency is nice, but if the fuel is free, why should you care? Because the less wood you burn, the less you have to cut. I've used as much as a cord of wood in 10 days, and for me that's too much work.

All that brings us back to the question of why steam vs. other forms of independent energy? Because, if you have a use for large quantities of heat, the exhaust from the engine will give you just that.

Steam engines and boilers are usually most efficient at full settings, all valves open, full fire, etc... so that brings us to the next subject:

AC vs. DC

In a home setting, electricity is the most common form of energy. Therefore, a steam engine/generator proves to be the most practical application.

Generators are either A.C. or D.C. and both have their applications. At Tiny Power's shop, our 4kw Winco is A.C. Unfortunately, A.C. requires precise speed controls in the form of a delicate governor and heavy flywheel. I would suggest that most folks should use D.C. instead. D.C. is easier to make, control, and most importantly, you can store it. By making D.C. electricity and storing it, the steam system can run at max capacity for a short period (most efficient) rather than idle along all day (inefficient). It is practical because you can make your electricity early, then get on about your business.

I ran a 1kw D.C. steam power plant as a tourist attraction here in Branson, Missouri, for a time and fell in love with high voltage D.C. The system ran lights and motors at 120 volts. The only drawback is D.C. is hard on contacts and switches. You have to buy those expensive switches and breakers that are rated for D.C.

Steam for home power

Tiny Power has 13 different models of engines plus accessories, and we cater mostly to hobbyists such as retired machinists and steamboaters worldwide. However, our heart still yearns towards self-sufficiency.

I myself am in the process of starting another company devoted to steam as a home power. I won't put it on the market until the system is foolproof, efficient, and affordable.

The following design will show a practical concept of a home-scale steam generator system. It is not an actual blueprint and I assume no liability for anyone who uses it as such. For those folks who think they are going to use their woodstove to make steam, please do the following: put me in your will, send the kids to live with grandma, give fair warning to the neighbors, and pay off your ocean-front property in Arizona.

Let us start with needs. Our home will need 2400 watt/hours of electricity per day. Since we only get 75% from a battery of what we put into it, we need to put in 3200 watt/hours (2400 / .75 = 3200). Even though 750 watts = 1 horsepower, there are inefficiencies in generators, belts, etc. A safe figure is a 30% loss, so 3200 watts over 70% efficiency = 4266 watts (3200 / .70 = 4571). Round up to 4600. Our horsepower requirement then is 4600 watt/hours divided by 750, which is 6.1 horsepower (4600 / 750 = 6.1).

Using 47 lbs of steam per horsepower hour to be consumed by our engine,

One-half-scale steam tractor

we take the 6.1 and multiply it by 47 and we get 286.7 or basically 287 pounds of steam/water is required.

We'll say that 1200 Btu's per pound of water/steam will be required to turn the water to steam at our working pressure of 120 psi. So, 287 pounds of steam/water x 1200 Btu's = 344,400 Btu's are required (287 x 1200).

Our boiler is 70% efficient, so 344,400 Btu's divided by 70% gives us the figure of 492,000 Btu's actually required (344,400 / .70 = 492,000).

Our wood contains a heat value of 7,000 Btu's per pound, so we need 70.3 pounds of wood (492,000 / 7,000 = 70.3). Let's spread the load over two hours, and we can see that we will burn 35.2 pounds of wood an hour (70.3 / 2 = 35.2), or about 35 pounds. To put that in perspective, that is a hefty armload of wood.

Remember, these are "real world" figures and are dramatically different from what some pink-hands so-called "educated" type will come up with.

If you follow the illustration in Figure 2, notice the direction of flow of fuel and water. This is a monotube design and will use electric pumps and blowers, giving easy control.

It will burn wood gas from "digesters" which heat the wood to ignition temperature but starve it for oxygen. This unburned gas is then mixed with heated air and burned at the base of the boiler. The combustion gases pass over the tubes of water and then over the air heater and on out the exhaust stack.

The water will enter the outside coil, pick up heat, go into the heat exchanger (desuperheater) and into the separator. Steam will exit the top of the separator and into the inner coil which acts as a superheater. The excessively hot steam will pass through the desuperheater, releasing some Btu's into the incoming water. The now "tempered" steam will head towards the engine, where it will do its work. The engine exhaust will travel into a coil which is inside the large tank and release its remaining heat into the water. Having done that, our steam will have condensed into water and is forced through a vacuum pump which exhausts into the "hotwell." From this point, it is pumped back to the boiler via a high pressure feed pump to start all over again.

This steamboat, with its typical power plant, was used in the movie Maverick.

Getting educated

I can't emphasize enough the importance of getting educated before you tinker. Large sawmills usually have a power plant, and engineers are congenial folks who always want to show off their "baby." Tour old ships or refineries, and don't be afraid to ask questions. You'll get more from somebody if you ask questions than if you try to tell them what you know.

The ultimate education is to attend a steam club show. There are literally thousands every year. Chances are you are less than an hour's drive from one. Make sure you bring the kids. The shows are definitely a family affair. Any hobby shop should be able to tell you where one is in the area.

Also, check out the various publications available. There are several magazines about steam engines. All have a large classified ad section. We strongly recommend one called The *Steam Show Directory* listing over 500 steam shows in this country and Canada.

Welcome to the fraternity.

For further reading

Live Steam
P.O. Box 629
Traverse City, MI 49685
(Steam engines of all kinds, on the Web, too)

Model Engineer
4314 W. 238th St.
Torrance, CA 90505
(Premier model making magazine, covers toy steam engines too)

Modeltec
P.O. Box 1226
St. Cloud, MN 56302
(All kinds of working models—steam, gas engines, hot air, etc.)

Steamboating
Rt. 1, Box 262
Middlebourne, WV 26149
(For the steamboat connoisseur, all sizes, great reading!)

Iron Men Album
P.O. Box 328
Lancaster, PA 17608
(Old steam tractors and stationary engines, large classifieds)

Engineers & Engines
1118 N. Raynor Ave.
Joliet, IL 60435
(Loaded with old engines and machinery, large classifieds)

Steam & Gas Show Directory
P.O. Box 328
Lancaster, PA 17603
(Lists all shows in Canada and U.S. This is a 'must have')

(Skip Goebel is chief engineer and part-owner of Tiny Power, Inc., which manufactures steam engines. You can buy their 50-page catalog for $5, or their 90-minute videotape for $10 by contacting them at P.O. Box 1605, Branson, MO 65616. Tel.: (417) 334-2655.) Δ

Considering life in rural Arkansas

By Sharon Goodman

The Northwest Arkansas area has been touted as an ideal place to live for those of us who want a quiet and natural rural setting, seclusion, etc. And it is. But like any such place, it does have other features.

I fell in love with this area 15 years ago, but I had to leave it after a couple of years, when the self-sufficient lifestyle I'd wanted more than my husband did predictably destroyed my marriage. (Best thing that ever happened to me, as it turned out.) Two of my sons moved me back to Texas, where I spent 10 years complaining about the virtual Texas police state and brutal heat before I could get back here in 1994.

Well, it's been an eye-opener. I still love the area, do not want to be anywhere else, and you may guess (rightly so) that I'm a natural born complainer anyway. But I do believe people should know as much as possible about what to expect when they make the move beyond the sidewalks. It's easy to be attracted to a beautiful chosen place when we only see its good points, but we don't need travelogues. We need an occasional disgruntled actual resident of the area to give us the lowdown on what we can't see. We're not likely to meet any of those until later, and it's a shame we have no source for the "nitty gritty" before we're in it.

I've been devouring *BHM* almost since the beginning, and I often notice letters from readers asking for real information on various places they are considering. So, because I qualify as "disgruntled" today, I'd like to start the ball rolling by volunteering some on the Northwest Arkansas Ozarks.

The climate is great, and property is comparatively low priced, just as you've heard. That's about it. There is no industry, but you can find work. You'll never make much more than minimum wage . . . or what it used to be, as they stay a little behind here, and that isn't going to change. The police are not too overbearing here; there aren't many. As long as you don't kill anybody or grow pot in the National Forest, they'll leave you alone.

Bureaucrats: we've got 'em

But be prepared to be messed with by the State of Arkansas to an inordinately high degree. First off, the State is going to tax your teeny wages.

Then they'll give that back to you next year because most people in Arkansas are too poor to owe any taxes. They are going to tax your food—not just your Kleenex and soap, but your cheap hamburger and your day-old bread. We have some of the highest sales tax rates in the country here, especially in tourist towns, and what they do with all that money, I don't know. They don't fix roads or bridges, and services of any kind range from few to non-existent. (All bridges have one of two signs: "Bridge may ice in cold weather"—no kidding!—or "Bridge impassable in high water"—this one about a foot from said bridge.)

Whether you need to use a photocopy machine or a medical facility, services mostly require a 60 mile drive and/or are closed on weekends (including the Saturday mornings that they advertise). When you find a job, work on weekends if you can: you'll need a weekday off to accomplish any personal business at all.

Property taxes are still fairly low, but that's changing fast. You will be reassessed and get your tax raised any time you build so much as a chicken coop that a person from the Assay Office can see by getting out of his car up on the road and trespassing on your property when you're not home. You'll be seeing the folks at the nearest Assay Office real often, so try not to slam the door hard enough to break the glass, because they know where to find you.

Every year when you renew your auto license, be prepared to provide six pieces of paperwork, each for the correct year, which you can't do right no matter what. So save time and present your personal body at the Motor Vehicle office on the square by the water tower of the nearest town, where they will send you to the courthouse to (A) collect papers for the right years, and (B) voluntarily present yourself to be assessed a personal property tax again, every year, on every vehicle you own. If you had to trade in a dead one for one that runs during the previous year, you're really in trouble.

Also be prepared to drive around to four different places to obtain an Arkansas driver's license. This is one of the several occasions per year when you have to get another inspection sticker, even if your present one is just three months old. When you take the eyesight test, do not put your face against the machine as instructed or you may get head lice. (I was warned and I didn't.)

...the only thing a pig understands is rapid gunfire, and then only when it hits him personally.

Roads

Drive with utmost care—country roads are a given hazard anywhere, but if you live down a few miles of dirt road here, and your county has a road grader (some don't), they "grade" the road by covering it with large, pointy rocks that chew up your tires, even if you don't go over 10 mph on it. And believe me, don't. Be just as careful driving on blacktop after the snow and ice melt, because they don't use road salt here; they use little round gravel ball bearings. These are mountain roads, and there are no guard rails anywhere. I learned that by sliding off one head first, over the side and into the (thankfully thick) woods. Stay off of "Scenic Routes" if at all possible, since they tend to have your half of the road crumbled away and laying down in the holler. And you'll have to get used to all the dead animals in the roads, because nobody ever picks them up.

You'll learn to go places by landmarks: even before you leave the blacktop here, the roads may be unmarked, and where they go is a big secret, known only to third-generation natives. The road that goes up my mountain has a name on the county plat map, but no sign anywhere tells what that name is. I know it because I live here; you won't. Don't try to give visiting relatives directions to your house; meet them in the Wal-Mart parking lot of the nearest town. If they get on the wrong mountain, they may never be found. I nearly lost my son-in-law that way.

Shopping? Wal-Mart.

There are few towns in Arkansas without a Wal-Mart, and if you're moving here, you need to check one out. Anything they don't have in Wal-Mart you will do without for the rest of your natural life. If you're used to buying any specialty items in your city or town, such as premium cat food, save a label so you can call the 800 number and have them ship it to you; you won't find it here. If you still smoke, quit. You can't afford it here.

Be prepared to live without all newspapers except local weeklies (and even if we were in a world war, the local weeklies wouldn't mention it), all good magazines (except they will deliver *Backwoods Home Magazine* here), and to never see a bookstore or a movie theater again. I do get one clear TV channel with the bonus of weather forecasts for southern Missouri, which is at least close.

Energy

If you have electricity here (and I refuse to do without it), it will be REA. Like any mountainous area, spring storms get pretty wild, and heavy snows cause a lot of damage. Still, they do a good job of keeping the electricity on, much better than rural East Texas does, that's for sure. Since I live on a mountaintop, my main rule (learned the hard way like everything else) is to yank every plug in the house out of the wall when I see lightning, and that includes the refrigerator if you can reach it.

REA rates are not high, but propane gas costs an arm and a leg. Plan on a

woodstove for winter heat; firewood, even if you have to buy it like I do, is cheap and plentiful. I would perish without my woodstove.

Water and soil and food

The water is no more pure here than anywhere else, and don't let anybody tell you different. Have your well tested before you drink from it, and never, never drink any surface water, no matter how clear it looks. There is a cause of certain pollution problems in my own area that I dare not name. If you come here, you'll know. Our water is extremely hard. You'll never see lather again. Chunks of minerals float in it after it's boiled, so I strain my coffee.

You'll want to grow as much of your own food as you can—no easy task in our alkaline soil that produces rocks in abundance—since grocery store produce is elderly by the time it gets here. Ocean fish is very expensive, and shellfish . . . well, just don't buy shellfish in Arkansas.

Varmints

Protect yourself at all times from ticks, chiggers, brown spiders, and poison sumac. You do not go into the woods without long sleeves, long pants, and a cap (I don't care if it's 100°) or step outside for even a minute without spraying your feet to keep chiggers off, from April to first frost. If you can't stand moths and other flying beasties in your house, dive-bombing your head all night, you really don't want to live in the woods.

And you don't go picking wild blackberries without a hoe sharp enough to kill a large snake. Rattlesnakes and copperheads are rampant in these hills. But at least we don't have fireants. Yet.

If you'll have chickens or other poultry, don't skimp on building their house. It will have to be a virtual fortress from underground to roof, in which you lock them up every night, or the raccoons and other varmints will wipe them out very fast. Yes, I know all the tricks for keeping raccoons away. No, they don't work. Neither does any effort to keep snakes out of the chicken house except underground rabbit wire. Wish I had it.

Keep everything you find laying around on your property because you'll need it sooner or later. I was sure glad to have an old boat tarp available when I accidentally caught a skunk in my Havaheart trap. The tarp was great to cover up my error and remain socially acceptable until I figured out what to do about him. Fortunately, he pulled the boat tarp into the trap bit by bit to eat, and died of tarp-poisoning. It's easier to dispose of a dead skunk than a live one. I don't dispose of anything live except for turning somebody's cat loose that was enticed into the trap by a sardine (coon bait). I got the Havaheart because it works, not so I could be humane to any animal that kills 10 of my birds in a week.

Domestic varmints

Unfortunately, wild varmints in the woods will not be all you have to contend with, and though I realize this kind of advice is not area-specific, I'd still like to pass it on: Don't shoot a neighbor's wild dog unless it actually has your dead favorite hen in its mouth. It will, at the first opportunity. Nothing keeps other people's packs of dogs off your property except a lot of expensive fencing that you get to pay for yourself.

Do shoot his loose pigs if they stampede over your place, and make him carry them off when you're done. A herd of grown pigs ("herd" being defined as any number greater than one) can destroy your entire vegetable garden and kill all your chickens in two minutes flat. Nothing can stop them; the only thing a pig understands is rapid gunfire, and then only when it hits him personally. There are no Babes in the real world. You just shoot until you run out of bullets. It takes three to knock down a grown pig.

Somebody's loose cattle are easy: you just run toward them yelling and waving your arms, and they'll generally head for home. The same thing works if your turkey escapes her pen and meanders off down the road, but it takes longer. You deal with animals much more than with people in these hills, but they fall into the same basic groups, from "family" to "criminal." Except, of course, the ones you raise for meat, and I presume you know not to give those names. It's hard to slaughter Bootsie.

A good place to live

In spite of all these adventures (at my age it's "in spite of," not "for"), this is a good place to live out your days, as I intend to, below poverty level but in relative peace. It's a good idea to keep as low a profile with the state as possible, and that might be easier for younger people. Of course, you are not going to expect progressive schools. I don't know much about the "guy" stuff, such as fishing, but all a new guy has to do to find out is hang out at the feed store for a day or so.

It's no easier or harder to be a woman alone here than anywhere else I've been. The people are no better or worse than those in other rural areas. But the natives and old-timers here, the hill people, are not your stereotypical hillbillies. They are tough, capable folks with a lot of good, practical knowledge that you need. Listen to them every chance you get. Most likely, you will not be invited into their inner circle, and there's not much you can do about that, but your grandchildren might. Very small towns can be very closed, here as elsewhere. You'll have a better chance of acceptance in tourist towns, where everybody is from somewhere else, or in retirement communities where everybody is from Chicago. Δ

Try these simple ways to get started in solar hot water

By Don Fallick

If you're looking for a cheap, easy, quick, and permanent way to secure hot water for your home, all year long, or even all day long, this article is not the place to look. In dealing with solar heat, those qualities are mutually contradictory. There are ways to have some of them, though, if you don't mind doing without the others, or figuring out some other way to get them.

The following solar water heating systems are good only for the months of spring, summer, and fall, and only provide really *hot* water when exposed to direct sunlight. Some work better than others, but all of them do work. I have used them myself and seen them in use in the homes of friends and neighbors.

Quick and easy

Ever leave a length of black "poly" pipe in the sun for a couple of hours? The water gets hot! The simplest way to build a solar water heater is to leave a coil of one-inch-diameter, black irrigation pipe in the sun. A 300-foot coil of pipe holds about 15 gallons of water. By mid to late afternoon, you'll have enough scalding hot water for two or three showers or a wringer washer load of laundry. On really bright summer days, you can even get two batches. You won't have to cut any firewood to heat it, pay the propane dealer, or even give any thought to it. Hot water "just happens" every time the sun shines.

Of course, there are disadvantages. The pipe cools off faster than it heats up, so if you want those showers *hot*, you'll have to take 'em when the water's hottest, between 2:30 and 4:30 in the afternoon. So it's not necessarily as convenient as most of us would like. (This problem can be eased if you connect the coil to a tank. If the tank is above the coil, you'll get thermosiphon circulation.)

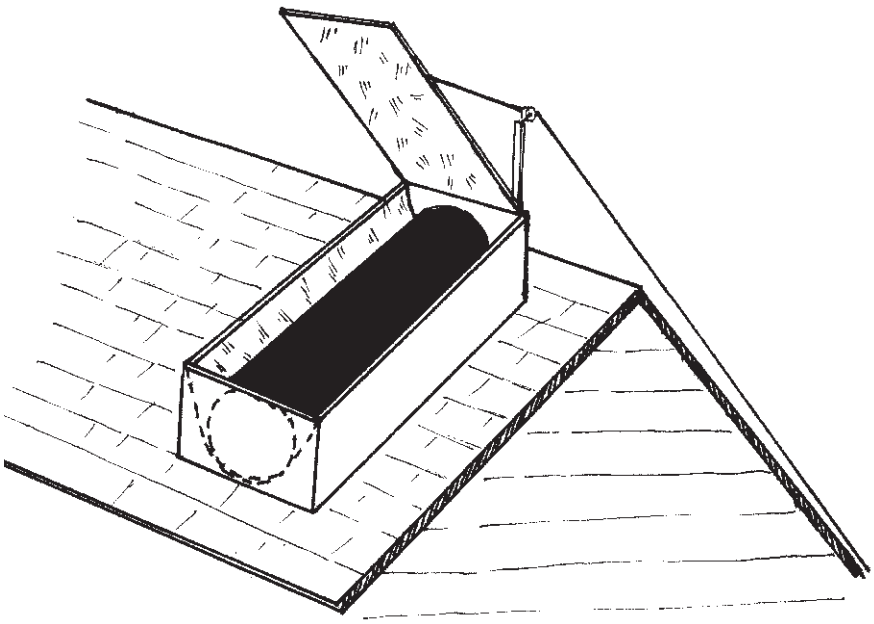
Nor is it exactly cheap. A 300-foot length of one-inch poly pipe will cost around $65 to $80. Worse, the pipe will have to be repaired annually and replaced every few years. Admittedly, this is still much cheaper than even a small propane water heater, and there's no expense for fuel. But considering the disadvantages in convenience, you may not think it worthwhile, except as a temporary expedient. Faced with a choice between building a house and cutting the extra firewood needed to heat water on the wood stove all summer, I installed a temporary "pipeline" heater. The savings in time and energy outweighed the inconvenience and added expense, and I eventually reused the pipe for irrigation.

Black tank

More convenient, and even cheaper, is a water heater made from the inner tank of a regular gas or electric water heater. A 30-gallon tank is about the biggest you want for this, unless you live somewhere with lots and lots of sunshine. As tank size increases, the relative area of the tank, compared to its volume, decreases. A solar-heated water tank absorbs at a rate proportional to half its surface area. The bigger the tank, the less heat is absorbed per unit of volume. A tank bigger than 40 gallons may not absorb enough heat in a whole day to get more than warm.

Strip the outer sheet metal and insulation from an old water heater, paint it black, plumb it into your hot water line, and you're in business. Not elegant, but it does work. Gas heater tanks have a fire-plate at the bottom, and a flue through the middle of the tank. This makes it easy to convert the tank into a wood-fired water heater for wintertime use.

A gas-fired water heater may be your best bet for another reason. Most folks keep electric water heaters until



Jeff Moore's rooftop solar water heater

the tank springs a leak, so you may have to haul home, check out, and haul away several before finding one that's intact. But gas heaters are rendered inefficient by calcification or silt in the bottom, which keeps the gas heat from reaching the water. A little sand in the bottom of a solar tank makes no difference at all, since that's the one part of a tank's surface that never receives any sunlight.

A solar water tank takes longer to heat up than a pipeline heater, so you may get only one batch per day. But even without insulation, it will retain heat much longer than a pipeline heater due to its much higher relative volume. Unfortunately, a solar water tank can only absorb heat on the side facing the sun, but loses its enyire surface. So it loses heat twice as fast at night as it gains it during the day.

Earth is a much better conductor of heat than air is, so it's important that the tank not be in direct contact with the ground. The usual way to accomplish this is to stand the tank up on its end, as it was designed to do. Just remember that water weighs eight pounds per gallon, so a full 30-gallon tank weighs close to 300 pounds. Be sure tank supports and bracing are up to their job.

The ultimate

If there were only some way to insulate a solar water tank, it would sure work a lot better. Fortunately, there is. My friend Jeff Moore painted a 30-gallon tank with black stove paint and mounted it on the south side of his roof, inside an insulated plywood box. There's a curved reflector behind the tank, made of thin paneling covered with aluminum foil, and a sheet of glass over the open top of the box. Jeff made an insulated cover for the glass by gluing a two-inch thick foam board to another sheet of paneling, and covering the inside surface with more aluminum foil. The cover is hinged at the top, and is arranged so it functions as an additional reflector in its open position. A clothesline, some braces, and a couple of pulleys allow Jeff to open and close the cover from the ground, and secure it in any position. It's so light that his seven-year-old daughter has no trouble opening it.

In its final form, Jeff's homemade solar water heater requires very little maintenance. It takes about two minutes every morning and evening to open and close the lid. And every now and then, Jeff directs a spray of water from his garden hose at the glass to clean off any accumulated dust. Every couple of years the aluminum foil gets dull from corrosion and has to be replaced. This costs about $5.00.

In its original form, though, the collector did have one near disaster. No, it didn't come through the ceiling. Jeff knows how heavy water is, and he made sure the roof was properly braced before filling the tank. But he had no idea how *hot* the water would get. He originally used black poly pipe to connect the tank's output to his house plumbing system. The first sunny day, the poly pipe melted, and all his hot water ran off the roof. Now he uses ABS Type II pipe, designed for hot water, and has no problems. Δ

A country moment

Shelley Felt, age 3½, of Kalkaska, Michigan

(If you have a country moment you'd like to share with our readers, please send it to us at Country Moment, *Backwoods Home Magazine*, P.O. Box 712, Gold Beach, OR 97444. Please include a self-addressed, stamped return envelope if you want the photo back.)

Fishing with Dave

The sun's going down,
The clouds are high,
We're fishing,
Drinking rum and Coke.
There are no broads
And the bugs aren't biting.
We need a few of these times
Before the black sack of eternity
Is slipped over our heads.

(Reprinted from the book, Sex and Sins in the Cemetery, by John Silveira, available from *Backwoods Home Magazine*.)

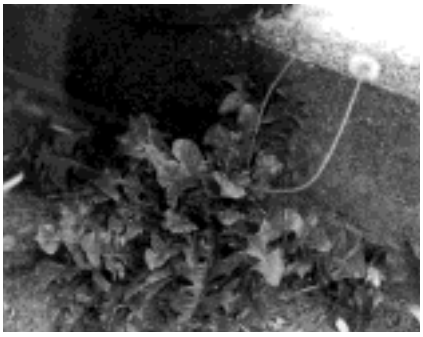
Better health from common plants

By Christopher Nyerges

We've all heard it: The true prophet is never accepted by his own people. By some strange quirk of human nature, we tend to think that only something from a faraway country can be of the greatest value. This blindness also affects us when it comes to herbs and nutrition. We think that the best substances for our health and nutrition are only those herbs and roots imported from faraway China or India or South American rain forests, sold at tremendous costs in small bottles at the herb shop.

When you scan the shelves of herb shops, it would be easy to come to the conclusion that health can be purchased in a bottle. In fact, many businesses push that very idea: "Buy our (expensive) product and you'll be happier, live longer, be free of disease, and have a great sex life besides."

But in this country we are surrounded with an unbelievable bounty of nature. Just about everything that you'd want for your health and nutrition can be found in your backyard or in the wild, or it can be easily grown. No money need change hands. Shockingly, many of the most nutritious plants on the planet are despised as common weeds, and at any nursery in town, you can buy poisons to kill off these valuable weeds. Such sad ignorance.



Dandelion

Gingko leaves and nuts

Here are some of the wild and free plants which you can use for your health and well-being.

Poor man's ginseng

Ginseng seems to be a valuable herb, but it doesn't grow around here-which means you have to buy it, and it's very expensive. On the other hand, just about everyone has dandelions on their lawns. Dandelions are probably better for you than anything in your garden, wild or cultivated. An analysis of 100 grams of dandelion greens by the U.S. Department of Agriculture shows 14,000 I.U. of vitamin A, 35 mg. of vitamin C, 397 mg. of potassium, 66 mg. of phosphorus, 187 mg. of calcium, and 36 mg. of magnesium. Dandelion greens are also the richest source of beta-carotene, with 8.4 mg. per cup. By contrast, carrots-considered an excellent source of beta-carotene contain 6.6 mg. per cup.

Only young dandelion greens are good in salads, and the older, bitter leaves can be cooked like spinach or added to mixed-vegetable dishes. And the young dandelion roots can also be eaten when cooked.

Nature's mineral tablet

The health food store shelves are full of pills, including mineral tablets. But nature provides an excellent "mineral tablet"—one that you take advantage of by eating. This is lamb's quarter, a spinach relative found worldwide in the wild. It probably grows in your garden even if you don't plant it. Used raw in salad or in juice mixes,

Lamb's quarters

Rose hips

100 grams of lamb's quarter (about a cup) contains about 80 mg. of vitamin C, 11,600 I.U. of vitamin A, 72 mg. of phosphorus, 309 mg. of calcium, small amounts of thiamine, riboflavin, niacin, and iron. These figures are slightly lower when you cook the lamb's quarter as a spinach-replacement, or in soups, egg dishes, or vegetable dishes. You could almost survive on lamb's quarter alone.

Clear thinking with gingko

Gingko leaves and nuts have been used in the Orient for centuries, and are one of the new popular herbal medications. Some researchers suggest that it may help Alzheimer's patients, and that it should help any one increase mental alertness. And there are several processed bottles of pills on the shelf with the expensive price tag.

Gingko is widely planted as a park and street tree. It is very common, and you can simply take the leaves and brew your own tea. Never mind that the pill manufacturers tell you can't do this-you can. Make an infusion of the leaves, or if you prefer, simply powder the dried leaves and fill gelatin capsules if you prefer to take your herbs that way.

Rose hips

And don't overlook the nuts which fall in September and October. The fleshy outer layer of these nuts have a foul odor, but that is easily cleaned .off. The nuts can then be dried or roasted and eaten, and many of the same qualities of the leaves have been attributed to these nuts.

Get your daily vitamin C

Roses are great to grow in any garden because they provide beauty and fragrance. Also, if you let the fruits mature (referred to as the "hips"), you'll have a rich source of vitamin C. The only known source of vitamin C that is richer is the acerola. Rose hips contain about 7,000 mg. of vitamin C per pound, a remarkable amount. By contrast, a pound of oranges (depending on the type of oranges) contains anywhere between 100 to 250 mg. of vitamin C.

To use rose hips, you snip off the orange-red mature fruit. Once you cut it in half and remove the fibrous seeds, you could just eat it raw. However, most people find it more enjoyable to simmer it into tea, or to make it into jams, jellies, or blended nutritional drinks.

A good source of calcium

One hundred grams of the edible portion of the carob pod (which is about a cup of the entire pod, minus the seeds) contains 352 mg. of calcium. That makes carob one of the very richest non-meat calcium sources. Even when that same volume is compared to milk-generally considered a good calcium source-carob is nearly three times richer in calcium. Carob is also a good source of B vitamins. Though not a complete protein, it is said that this is the food that sustained John the Baptist in the desert for 40 days (hence the name, Saint John's bread). You can simply eat the pods and spit out the seeds. Also, you can crack the pods, remove the seeds, and grind the pods into a flour which you add to bread and pasty products, or blend into liquids like rice or soy milk.

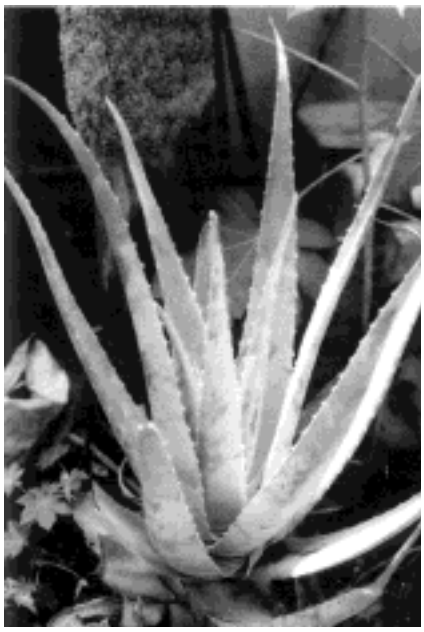
There are tens of thousands of carob trees throughout Southern California and the Southwest, mostly as street and park trees. The brown leathery pods ripen from September through February.

Cough and sore throat

Oil of eucalyptus is a common active ingredient in many cough medicines, and eucalyptus trees are extremely common. You can simply pick a few eucalyptus leaves, make a hot tea by infusion, and drink it. The flavor of the various eucalypti vary, so you might smell around until you find a variety you like. This tea is useful for most breathing and respiratory ailments.

Cuts and bruises

When you get a few minor cuts and scratches while doing work, do you reach for that tube of creamy stuff and rub it over your cuts? There's some-



Aloe vera plant

Purslane

thing better. You could just pinch off a bit of an Aloe vera plant, break open the leaf, and spread that gel directly onto the wounds. Aloe has been used for centuries for just such medicinal applications. Aloe is easy to grow in pots or in the garden and is widely available at nurseries. Even the best bottled aloe preparations are not as good as the fresh plant.

Cholesterol

You have high cholesterol, and there are a number of things your doctor has told you to do: Cut out salts, fatty and oily foods, stop smoking and eliminate alcohol. Exercise more, and lose some weight. Did you know that numerous studies have shown that including garlic and onions in your diet can reduce your cholesterol level? We don't normally think of garlic and onions as "medicine," but they have a variety of proven or reputed medical properties, and the lowering of cholesterol levels is perhaps the most documented. In this case, you simply eat your garlic and onions-ideally raw where possible, but cooked also-in order to receive the benefits.

Speaking of cholesterol, another good way to lower cholesterol levels is to include foods in your diet that are high in Omega-3 fatty acids. In 1986, two biochemists (Norman Salem, Jr. with the National Institute on Alcohol Abuse and Alcoholism in Bethesda, Maryland, and Artemis Simopoulos of the American Association for World Health in Washington, D.C.) discovered that a common weed, purslane, is the richest leafy-plant source of Omega-3 fatty acids. And purslane is such a common weed, world-wide, that you shouldn't have to plant it you may just need to look for it. It is common in rose beds. To take advantage of purslane's benefits, you simply eat it in salads- or cook it into soups stews. vegetable dishes etc.

Headaches

Have a headache? Before you automatically reach for that aspirin, first ask yourself: What is the source of the conflict which is resulting in my headache. Perhaps your pain is trying to tell you something. Then, consider the original source of aspirin, the inner bark of the willow tree. The cambium layer of willow bark contains salicin, which the body converts to salicylic acid-the active ingredient in most aspirin. If you grew a willow bush or tree in your yard, you could prune off a small twig, remove the bark, and brew that bark for a few minutes in warm water, and then drink it for headaches. The tea may be mildly bitter, but will work (more or less) as well as aspirin. Willow is extremely common world-wide along waterways.

Diabetes

According to long-standing traditions throughout Northern Mexico, eating the young prickly pear cactus pad (once the stickers are removed) is said to help with diabetes. In the past

Willow

Prickly pear cactus

20 years, we have met dozens of people who claim to have had relief from adult-onset diabetes by consuming the cactus, and we've met three who actually stopped taking insulin. Doctors who have researched this have come up with some medical verification. They say that the prickly pear contains a substance which strengthens the pancreas so it is more able to produce insulin. Plus, they say the fibre content of the cactus is beneficial. In addition, consuming the cactus fruits has been shown to be helpful where prostate problems are present.

These are just a few examples of how we can obtain many of our needed healthful vitamins, necessary nutrients, and even medications from plants growing all around us.

Needless to say, none of the above is intended to replace competent, professional medical care for serious illness. In the interest of increasing wisdom and self-reliance, learning which plants can be used in place of bottled vitamin pills and simple medicines can be health-promoting.

(Christopher Nyerges is the author of In the Footsteps of Our Ancestors: Guide to Wild Food and other books. His schedule of outings is published in the *Talking Leaves Newsletter*, available from the School of Self-Reliance, Box 41834, Eagle Rock, CA 90041. The newsletter can be viewed on-line at http://home.earthlink.net/nyerges/.) Δ

Getting the most out of a solar electric system

By Paul Jeffrey Fowler

When our son Terry was born in March of 1992, my wife Lea and I made the formidable decision to sell the remaining half of our solar electric business to our partner. We wanted to spend as much time as possible with Terry during his preschool years. In addition to our homestead work, we hoped to make ends meet through independent, home-based employment, such as writing books and articles about independent living.

As the head of our solar electric business for 10 years, I had spent a major portion of each day designing solar electric systems. These ranged from sample systems for the next catalog or book to the solar electric systems for our many customers. When I was not designing systems, I was trouble-shooting them on the phone. I enjoyed the work and found time to upgrade our home system as an example for customers, but I never had enough energy left over to play with my own solar electric toys.

Within months of my departure from Fowler Solar Electric, Inc., my interest in solar electricity started to percolate once again. Lea and I had decided not to work professionally for the first year, to compensate for the vacation days we had always neglected to take. We wanted to finish the house and the home-related projects we had been waiting for years to do. I began to daydream about improving our solar electric system. I would follow my wife around, accosting her with my latest brainstorms. It was great fun thinking about our own solar electric system instead of a customer's system.

After a year of finishing the house and working on our homestead, I started writing my new book, The Evolution of an Independent Home. As I chronicled the development of our home and the coming of age of solar electricity for four hours each day on the computer, I relived the design and installation of each generation of our own solar electric system. In the afternoons, while I cared for Terry, I would design my next and ultimate solar electric system.

The Fowlers' home has solar modules on the house and on the garage.

I had one problem: Lea and I were already the proud owners of a very large solar electric system. We owned a large system because we had tried to be an example for our customers, and we had had the good fortune to own a business that sold the components to us at distributor cost. Our solar array consisted of 24 33-watt Mobil Solar modules on the house and eight 48-watt Hoxan modules on the garage. These modules produced 1200 peak watts, the equivalent of an array of 20 modern 60-watt modules.

We stored our power in a 1600-amp-hour 24V (24-volt) battery bank consisting of 32 200-amp-hour, 6V Trojan golf-cart batteries (the equivalent of 16 L-16 6V batteries). Our large battery bank was designed to even out the sporadic winter sunlight in New England, and to decrease the need for a generator to supplement our low winter solar electric production. Our Trace 2624SB 2600-watt inverter was large enough to power any and all of our 120VAC (120-volt alternating current) loads.

A wind machine?

A few weeks after I completed the first draft of my book, Lea, Terry, and I helped our neighbors, Bob and Karin Cook, raise their new Bergey 850-watt wind machine and tower. Bob had read Paul Gipe's new book (Wind Power for Home and Business) on wind power. He decided not to expand his 440 peak-watt solar electric system, but instead to add a wind

machine to it. He hoped to produce a lot of power from winter winds to balance the low winter output of his solar electric system. Bob, a great student and researcher, came to the conclusion that the Bergey was the best in its size class. My old business offered to purchase the wind machine for him at a discount, to facilitate the experiment.

Naturally, I got personally involved in the project. Our solar electric system was large, but we could still benefit from an additional supply of electricity in the winter. I wanted a new alternative energy project so badly that I too considered installing a wind machine that fall. I hesitated even though we live at a good wind site. We have grown to live in awe of the lightning at our home site. Summer thunder storms are violent. I spent my early years with solar electricity learning to protect our solar electric system from lightning damage. I was worried that the addition of a tower would give me another source of lightning-induced high-voltage surges to endanger the inverter and controls that I had worked so hard to protect. And Lea and I knew we really could not rationalize the $3000 it would cost for a wind machine and tower.

Our neighbor's new wind machine was just visible above the tree line from our upstairs bedroom, a third of a mile away. Though I knew that installing a wind machine at our house was unlikely, I could still watch our neighbors' wind machine every day. I realized I had a unique opportunity to monitor the wind machine's energy production in comparison with our own solar electric system. I learned to roughly estimate the output of the wind machine by watching the speed of the propeller. Every day, I observed the production of the wind machine and then checked the state of charge of the battery bank in my system. Whenever the battery bank was fully charged, I knew that the wind machine, if it had been part of our system, would have been producing power that we could not have stored. On other days I could see that the wind machine could have restored our battery bank to full charge, but that the next several days were sunny. Our solar modules would soon have recharged our batteries without the additional power from the wind machine. There were also cloudy spells when my solar modules did no charging, but the wind machine had no wind to turn it.

A generator?

After monitoring my neighbor's wind machine that fall and winter, I knew it would not be a good partner to my large alternative energy system. I began to suspect that I really did not need additional electrical production for the whole winter. What I needed was an on-demand source of electricity for a few selected days during the occasional winter when there were one or two three-week cloudy spells. In the past, we had managed these cloudy spells by lowering our electrical usage until the sun returned. We had avoided the obvious solution of owning a backup generator.

We had always owned an inverter with an integral battery charger and transfer switch. If ever we accidentally ran our batteries too low, we could always get a generator and power the house with it while the inverter's internal battery charger replenished the battery bank. I had considered improving our winter supply of electricity by charging the batteries with a backup generator. However, I could not rationalize purchasing a $1,500 generator that would sit idle in the garage for most of the year. It would require plenty of maintenance just to keep it ready to use. My final solution was to rent a generator for one day during an occasional bad winter and run it for 24 hours to get our money's worth.

4000-watt Trace sinewave inverter

The more I worked on plans to expand our solar electric system, the more I realized that I could get the greatest amount of usable output by balancing our energy use to the system's production. Instead of purchasing a wind machine, a generator, or more solar electric modules, I could conserve electricity in the winter when sunlight is less plentiful, or find a suitable way to provide on-demand additional power, or both.

A new inverter

Once I have worked long enough on a project to have my theory in place, I find many of the practical considerations just happen. An old friend of mine in the alternative energy world offered me a 4000-watt Trace 4024 sinewave inverter at a great price. It was an early test model that had been scratched and dented but was fully updated to the latest specifications.

I bought the inverter because it was the right price to upgrade to a true sinewave inverter from my standard quasi-sinewave inverter. The increase in output from 2600 watts to 4000 watts did not seem very important, because the old inverter was adequate for my home. Even the true sinewave output did not seem that important. However, the new inverter had one feature that I coveted, a completely redesigned internal battery charger. My old inverter could produce a 60-amp maximum charge at 24V, but unfortunately it worked by taking the tops of a generator's sinewave. That type of charger really needed to be powered by at least a 5000-watt generator to supply its full 60 amps of charging. Furthermore, the charger

was fussy about which makes of generators powered it.

The new charger in the Trace 4024 was much more efficient in its conversion of 120VAC power to 24VDC. It could produce a maximum of 120 amps, and do it from most generators 2500 watts or larger. This charger would charge my battery bank in half the time, so the generator would only run half as long and consume only half as much fuel. With the new charger, we could theoretically run our large battery bank down to half-full during a long cloudy spell and recharge it on eight hours of generator run time. The new charger made it more attractive to utilize a backup generator to supplement our system, because the generator would be running fewer hours.

Tractor power

One day, I had the brainstorm to track down a PTO (power takeoff) generator to be powered by our tractor. PTO generators have no engine: they are rotated by a drive shaft that connects to a power takeoff on the rear of a tractor. The tractor is parked in neutral, and the tractor motor turns the drive shaft and the generator. This sounded good to me, because our tractor is new and in good repair, and there would be no extra motor to maintain.

I was disappointed to find that 8000-watt PTO generators were not available, and the larger models cost $2000-3000. However, several more phone calls produced a 25-year-old 15,000 watt model that had been gathering dust for years at my tractor dealer. I tested the windings, gave them $475, and loaded the 400 lb. unit in my Bronco II. Somewhat serendipitously, I had completed my design for an on-demand source of power for our independent energy system.

I upgraded the three-point hitch frame for the generator to make it mount easily on the tractor. I could even mount it in the garage, back the tractor up to it, and exhaust the diesel fumes out the wall of the garage, if ever I planned to use the generator regularly. Ideally, I might never need to use the generator.

Reducing demand

The second part of my plan to enhance our power for winter was really another anti-expansion plan. I wanted to improve the load side of our system such that we would use less power for the same appliances and level of comfort, and thus have more power for additional loads and a lesser likelihood of utilizing the backup generator in cloudy times.

I had been slightly concerned about the efficiency of our new 4000-watt inverter. The efficiency curves looked good, but the unit required 15 watts to power its own electronics whenever it was powering a load, while our old inverter had only used eight watts. This would be a negligible factor for large loads, but would be very inefficient when we were powering 25 to 50 watts of lighting. I estimated the inverter would be on for ten hours per day and use 70 more watt-hours per day than our old inverter.

I noticed that our large vacuum cleaner ran quieter on the new inverter. It also ran cooler. The same pattern was true for our clothes washer, large power tools, and most likely for our deep-well pump. With the help of my friends at Trace, I came to the rough conclusion that our motor loads were running 10-20% more efficiently on our new sinewave inverter. At 1000 watt-hours per day of motor loads, we were saving more watt-hours than I was worried about losing to the 15 watt base drain of the electronics of the inverter.

I purchased an AST notebook computer to use as my main computer, and relegated my desktop computer to my wife's computer needs, which take less time than mine. The desktop computer consumes 100 watts, but the new notebook only consumes 15 watts. That first winter, I averaged three hours of computer use per day while I completed my book project. I saved 255 watt-hours per day of electrical energy.

In the spring, we purchased a Staber washer machine because of its high efficiency. The Staber is a full-size washing machine that uses 250 watt-hours per load, versus the 450 watt-hours per load consumed by our old standard clothes washer. This innovative washer also cleans so much better that we save another 25 watt-hours because we can wash clothes on a shorter wash cycle. The Staber needs only one ounce of powdered detergent per wash load, one quarter what we used in our old washer. This feature saves no power, but it does save a lot of money. Finally, it washes with half the amount of the water, a savings of 40 watt-hours of water pumping per load. In total, the Staber saves 265 watt-hours per load, which at two loads per day represents a savings of 530 watt-hours per day.

We had been somewhat sloppy in our use of lighting. We had several pretty brass and glass ceiling fixtures in the living room, kitchen, and bathroom (installed before compact fluorescent bulbs came to market), which used 40-watt 120VAC incandescent bulbs. They were fairly efficient, because all of the light that they produced was transmitted to the room through the clear glass. To increase our efficiency, we installed extra fixtures and lamps in these rooms that hold 15-watt compact fluorescent bulbs. When the weather is cloudy, we can use these new lights to save another 250 watt-hours per day.

Adding up the savings

Our conservation methods saved us an average of 1035 watt-hours per day. These savings were projected for the winter when our solar electric array produces only half of what it does in the summer. For our area, one 50-watt solar electric module pro-

duces a daily average of 100 watt-hours per day of electrical energy that is actually usable in our home. Therefore, our conservation resulted in a "negative-need" for ten 50-watt solar electric modules, or 500 peak-watts of our array. You could consider that 500 watts had been freed up to be used to make the long no-sun parts of winter easier, or to power additional loads. Or, to look at it another way, if we were purchasing our solar electric system today, we would need ten fewer 50-watt modules.

It cost $500 to upgrade to the newer sine-wave 4000-watt Trace inverter. We also spent $475 for a backup generator. For a total of $975, we now have an on-demand power supply to supplement our alternative energy system in the worst years of electrical production.

We spent $500 more for a notebook computer than for a comparable desktop computer. We spent $900 on a Staber washing machine, which is $450 more than a standard model. We spent $200 on compact fluorescent bulbs, lamps, and fixtures. This comes to a total of $1150 we invested to conserve 1035 watt-hours per day in the winter. To produce these 1035 watt-hours of electricity energy in the winter, we would have needed ten $300 50-watt modules, a $3000 investment.

In the beginning, I flirted with spending $3000 to install a wind machine and tower to supplement our solar electric system in the winter. I invested much less money to conserve energy and meet the same goal. If you have a very small solar electric system, you will most likely find that it will be necessary to invest in more energy-producing components, such as a wind machine or solar electric modules, and additional storage capacity. But if you have a medium or large system, you might spend some time to see if you could invest in more efficient appliances to meet all or part of your expansion needs.

(Paul Jeffrey Fowler is the author of the Solar Electric Independent Home Book, available from *Backwoods Home Magazine*, and most recently the author of The Evolution of an Independent Home: The Story of a Solar Electric Pioneer, 1995, ISBN 0-9645111-7-7, distributed by Chelsea Green.) Δ

Sometimes a good old bucket of coals is the best solution

By Nancy Owen

Twenty years ago, like many beginning homesteaders who don't plan ahead carefully enough, we created a problem for ourselves. Our well, with its pump and tank, needed protection, so when we had cement blocks left over from a construction project, we built a 4' x 4' well house. The thought of freezing pipes didn't worry us: those heating cables with thermostats would supply the needed BTUs.

But what about those winter ice storms that knocked out the electricity? Or the mouse that chewed a cord in two? Or those unusual cold fronts that whipped through our woods with 20 mph winds and temperatures near zero? We hadn't planned for those nights and for pipes freezing in only a few hours because cement blocks with an insulating R-value of about one simply won't hold heat.

Our first solution was to collect styrofoam "peanuts," remove the well house's portable roof, and painstakingly fill the cores of the cement blocks. Halfway through that chore, we decided sand or sawdust might have worked better, as the peanuts were difficult to poke through the off-set cores. But we persisted, and probably got the R-value up near two. But then on windy, bitterly cold nights, the pressure switch line would still freeze.

One day, after surviving a night of 2°, it froze at 8:15 a.m., and that morning we stumbled onto an answer. We set a small bucket of live coals from our woodstove in a corner of the well house. Fifteen minutes later the temperature had hit 85°, and the pump came on.

Experimenting with the coals, we discovered the best method is to use a minnow bucket, which has a perforated container inside a regular bucket. We put ashes on the bottom, coals in the middle, and more ashes on top. Then the coals don't just die as they do in a regular bucket, but, breathing through the holes, burn slowly and keep the temperature above 32°.

Our bucket of coals also enables us to be just a little bit less dependent on the electric company. Δ

We built a homemade community fire truck

By Don Fallick

It takes our local volunteer fire department 45 minutes to respond to a call for help. This is actually pretty fast, considering that they have to assemble, dress, and drive 12 miles of rutted dirt road in a big fire truck to get here. But because the first 45 minutes of a fire are the most important for fire fighting, it's a potential disaster. After years of fighting fires with buckets and shovels, my neighbors and I decided to do something about it. We built a homemade fire truck capable of fighting a local fire for that critical first 45 minutes.

Design considerations

One neighbor donated a gas powered irrigation pump capable of pumping ten gallons of water per minute. This determined the size of our tank truck. To last 45 minutes, we needed at least a 450 gallon tank. Another neighbor had an old 500 gallon water tank that was too rusty to use for domestic water. That fit our pumping capabilities just fine, but when we went looking for a truck we had a problem. Water weighs eight pounds per gallon, so 500 gallons weighs **two tons!** The tank itself weighed several hundred pounds more, plus another couple hundred pounds of hoses, shovels, and other equipment, which makes for a heavy load. Much too heavy for even the biggest pickup truck. Fortunately, another neighbor owned a broken down, two-ton flatbed truck that he wasn't using. It didn't have many miles left on it, but then, we weren't planning on driving it very far. We were able to fix it up so it would start reliably and haul our gear and water everywhere we needed to get it.

We decided at the beginning to design our fire truck to be as mechanically simple as possible. We wanted to be able to get water out of the tank by gravity flow, even if the pump failed. We also wanted to eliminate the necessity to either keep the pump "wet" all the time, or to prime the pump or establish a syphon before starting it. So we mounted the tank like a barrel on its side, with the outlet at the bottom.

Building the truck

The hardest part of building the truck was mounting the tank. First we had to clean it out thoroughly, to be sure no rust or gunk could clog the pump. Rinsing out a 500 gallon tank takes a while. When the water finally ran clear, we used chains and a neighbor's tractor to load it onto the truck. Then we had to fasten it there. Another neighbor with an arc welder fabricated straps out of some flexible scrap steel, which we welded to the tank and the rim of the truck bed. Between the straps and blocks fastened to the bed, we created a cradle that kept the tank from rolling, even when full.

Mounting the tank this way had an added advantage—it left room for hoses and equipment. Our pump was intended for irrigation, not high pressure, so we didn't need high pressure hoses. We did need long hoses, though. We hoped to park within several hundred feet of a fire, but knew that our hoses might have to reach a thousand feet under less than ideal conditions. At this distance, you need the largest diameter hose you can get, to minimize pressure loss at the nozzle due to friction. You also need non-kinking hose, especially when working in a forest. We used 100 foot sections of 3/4" diameter, reinforced garden hose. Each neighbor bought and donated a section, which minimized individual expenses.

We live in an area with many springs and creeks, so it seemed foolish not to provide a way to pump water out of them directly if necessary. For intake pipe, we stocked 300 feet of 1" diameter, black, "poly" irrigation pipe in hundred-foot lengths, figuring that the pump probably wouldn't be able to draw a useable amount of water much further. Finally, we stored about a dozen five-gallon, plastic buckets on the truck for an emergency bucket brigade.

Other equipment

The hoses, pipes, buckets, pump and tank comprised our water-handling equipment, but not all of our fire-fighting gear. We also included axes, shovels, and rakes for building fire breaks. Through experience, we had learned that these tools can be as effective as water in preventing the spread of fire. It was our intention to include a chainsaw as well, but nobody was willing to donate a good one, and a fire truck is no place for unreliable equipment. Everybody always brings whatever gear they have to a fire anyway, so we did without a chainsaw, though we did include a nice, sharp bow saw, "just in case."

We also included a large First Aid kit, stocked mostly with large dressings, burn cream, and salt tablets. We hoped never to have to use these, but figured the best place for them would be in the cab of the community fire truck. One neighbor suggested a citizen's band radio might be useful, but we never did get one. The truck had a six-volt electrical system, and all the available CBs were twelve-volt.

We parked the fire truck under a shady tree at the side of the county road, near the center of the community. Originally, it was our intention to mount a fire bell there as well, but we found that large bells are extremely expensive. We finally decided on a goofy sounding horn from J.C. Whitney & Company, mounted right on the truck. But it turned out that we didn't need it. The truck's original horn was loud and distinctive enough. I was disappointed. I think it would have been fun to have the only fire truck in the county that could whistle "Dixie" on the way to a fire.

Conclusions

As it turned out, we never used our homemade fire truck. We had three wet summers in a row, with no natural or man-made fires in the area. There were constant battles over who was in charge of training volunteers and maintaining the truck. Neither ever got done. Then the owner of the truck got into financial difficulties, and it turned out that the truck didn't really belong to him. There was a big legal battle; the truck's registered owner took it back, and much of the other equipment was lost or stolen. The irrigation pump's owner did get his pump back, but refused to get involved in another fire truck project. The tank was accidentally destroyed while being removed from the truck, and the project died. The very next summer was hot and dry, and we had to fight two forest fires and a grass fire. We could certainly have used our homemade fire truck then, but nobody was interested in starting over.

If I had to do it over again, I would do a few things differently. The design of the truck was fine, but I would create a legal entity to accept ownership of the truck and responsibility for it. This could be a partnership or property owners' association. Equipment would be donated outright, not loaned. I would get expert training for all the volunteers, from local fire departments, the U.S. Forest Service, or both. Finally, I would put one person in charge of the truck. This could be a rotating job, but at any given time, there would be someone accountable for maintaining and stocking it. When all is said and done, it turned out that our community relations generated as much heat as a fire—and were nearly as disastrous. Δ

The Farm fire truck

A New World Order

The dogs strut freely in the yard.
They've broken their chains.
Their master is dead.
There'll be no more kicks
From his cheap boots.
And no more tyranny.
We heard them howl all night
About their new found freedom.
But look,
Their muzzles are red.
They can hardly keep from
Sinking their teeth
Into each other's flesh.
And some have gone into the house
And searched through Master's closets.
They've tried on his boots and…
Surprise!
They fit their little doggy feet
Perfectly.

(Reprinted from the book, Sex and Sins in the Cemetery, by John Silveira, available from *Backwoods Home Magazine*.)

Where I live

By Annie Duffy

Nine-patch, baby, and log cabin quilts

In the old days, girls had to complete a certain number of quilts before they were married. Now, though, girls rarely quilt. I learned to sew at an early age, with my mom and Baba (grandmother). But I didn't learn to quilt until I was eight.

Annie Duffy with baby quilt

Nine-patch

My first quilt was a nine-patch. With my particular quilt, each block is made of three different fabrics, and no fabric is repeated in another block. Each block has nine four-inch squares—four of one color, four of a second color, and one square of yet another color. The blocks are put together like a checkerboard, with the unique square in the middle. Two of the blocks have horses in them, so I refer to the quilt as the "Horse Quilt." I didn't have quite enough fabric for the back, so I winged it by adding a border of the horse fabric around the edge. I wanted something special to bind the quilt, and when I found a binding that looked like rope I knew it would be perfect. I entered the quilt in the county fair, where I received a blue ribbon along with an invitation to exhibit it at the state fair.

Baby quilt

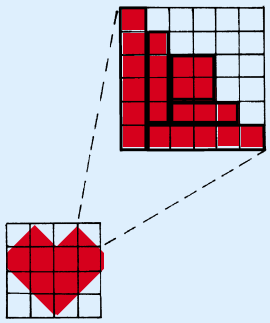
Before my baby brother, Sam, was born, I wanted to make him a quilt. Since we didn't know whether he would turn out a boy or a girl, I didn't use blue or pink. Instead, I used different shades of grey and brown. I didn't really use a pattern to make the quilt, but realized afterward that it was a variation of a log cabin quilt. Each block is identical. I used a teddy bear fabric for the center square, then put a border of grey around it. I had planned to put subsequent borders of dark and light brown around it, but found that I wouldn't have enough fabric for the whole thing if I did it that way. Instead I did half borders. I only bordered the top and left sides of each block. I joined all of the six blocks with a thin lattice and border of medium brown. Then I put on a wide border of light brown, and an even wider border of dark brown. Again, I miscalculated the yardage for the back of the quilt, so I added a strip of dark brown down the center. I didn't use any special binding because I wanted the edge to be soft. I did, however, add some fancy stitching to the border. I finished the quilt by writing a dedication with a permanent fabric pen: "Made with Love for Sam by his sister Annie, March 1995."

Log cabin quilt

I'm now in the process of making a log cabin quilt. Each square of this type of quilt is made with two inch strips of fabric, increasing in length that surround a smaller square. I designed this quilt with 16 blocks. I had seen it done with only nine, but it looked too blocky. It's going to be a Valentines quilt. I'm using only red and white fabrics, and all of the fabrics (except the solid red and white) have a heart design. All but two of the

Close-up of baby quilt

16 blocks have a red center. The two that don't have a white center with all light-colored strips. Six of the red-centered blocks have all red-colored strips. The remaining eight blocks are made as follows: on two sides of the small square, light strips are used, and on the other two sides red strips are used (see sketch).



Block arrangement for log cabin quilt

I arranged the blocks to form a heart shape, then put three thin borders all around it. The only thing left to do is sew it to the batting and the back. Then I'll quilt it. Who knows? Maybe next fair I'll get a blue and an invitation to exhibit it at the state fair. Δ

The incredible cattail — "The super Wal-Mart of the swamp"

By Kevin F. Duffy

I can think of no other North American plant that is more useful than the cattail. This wonderful plant is a virtual gold mine of survival utility. It is a four-season food, medicinal, and utility plant. What other plant can boast eight food products, three medicinals, and at least 12 other functional uses?

Cattails in winter

The Common Cattail (Typha latifolia) and its brethren Narrowleaf Cattail (Typha angustifolia), Southern Cattail (Typha domingensis), and Blue Cattail (Typha Glauca), have representatives found throughout North America and most of the world. While living in Northern Japan, I spent many chilly mornings in snow storms among miles of cattails while duck hunting. Cattail is a member of the grass family, Gramineae, as are rice, corn, wheat, oats, barley, and rye, just to mention a few. Of the 15 most commonly consumed domesticated plant foods, 10 are grasses. However, of more than 1300 wild grasses, none holds a loftier position as a survival food than cattail. Just about any place you can find year-round standing water or wet soil, you can usually find cattails.

In Euell Gibbons' Stalking the Wild Asparagus, his chapter on cattails is titled "Supermarket of the Swamp." As you will see, this title aptly applies to the cattail. However, due to its medicinal and utilitarian uses, we may want to mentally modify the title to "Super Wal-Mart of the Swamp."

Identification

Cattails are readily identified by the characteristic brown seed head. There are some poisonous look-alikes that may be mistaken for cattail, but none of these look-alikes possess the brown seed head. Blue Flag (Iris versicolor) and Yellow Flag (Iris pseudoacorus) and other members of the iris family all possess the cattail-like leaves, but none possesses the brown seed head. All members of the Iris family are poisonous.

Cattail, Common and Narrow-leaf

Another look-alike which is not poisonous, but whose leaves look more like cattail than iris is the Sweet Flag (Acorus calumus). Sweet Flag has a very pleasant spicy, sweet aroma when the leaves are bruised. It also does not posses the brown seed head. Neither the irises nor cattail has the sweet, spicy aroma. I have seen large stands of cattails and sweet flag growing side by side. **As with all wild edibles, positive identification is essential. If you are not sure, do not eat it.**

Corms, shoots, and spikes

In just about any survival situation, whether self-imposed or not, one of the first plants I look for is the cattail. As a food plant, cattails are outstanding and offer a variety of food products according to the season. In early spring, dig up the roots to locate the small pointed shoots called *corms*. These can be removed, peeled, and eaten, added to other spring greens for

Cooked male and female pollen and bloom spikes

a salad, or cooked in stews or alone as a pot herb. As the plant growth progresses to where the shoots reach a height of two to three feet above the water, peel and eat like the corms, or sautee. This food product is also known as "Cossack Asparagus" due to the Russians' fondness for it.[1]

In late spring to early summer, some of my favorite food products come into fruition on the cattail. Soon after these shoots become available, the green female bloom spikes and the male pollen spikes begin to emerge. These spikes can be found in the center of the plant and form a cylindrical projection that can only be detected when you're close to the plant. Peel back the leaves in the same way you would shuck corn, and both the male portion above and the female below can be seen. The female portion will later develop into the familiar brown "cattail" seed head from which the plant's name is derived. The male portion will atrophy into a small dried twig that may easily break off the top of the seed head. Both the male and female pollen spikes can be boiled and eaten like corn on the cob, and both are delicious. The male portion provides a bigger meal at this stage. They have a flavor that is corn-like, but distinct from corn. I cannot imagine anyone finding the flavor objectionable. Both may also be eaten raw.

Pollen and root starch

Later, the male pollen head will begin to develop an abundance of yellow pollen with a talcum powder consistency that can easily be shaken off into any container. Several pounds of this can be collected in less than an hour. The traditional use of this pollen is to substitute for some the flour in pancakes to make cattail pancakes. This also works well with cornbread. Other uses of the pollen include thickeners or flour extenders for breads, cakes, etc.

In late summer to early fall, the tender inner portions of the leaf stalk may still be collected, but the availability of this Cossack Asparagus begins to dwindle, due to the toughening up of the plant. During this period and all the way to spring, the most abundant food product, the root starch, may be harvested. It is so abundant, a study was conducted at the Cattail Research Center of Syracuse University's Department of Plant Sciences. The chief investigator of the project was Leland Marsh. The reported results were as follows:

Yellow Flag, a poisonous cattail look-alike. None of the look-alikes has the characteristic brown seed head.

> Yields are fantastic. Marsh discovered he could harvest 140 tons of rhizomes per acre near Wolcott, NY. That represents something more than 10 times the average yield per acre of potatoes. In terms of dry weight of cattail flour, the 140 tons of roots would yield approximately 32 tons.[2]

To extract the flour or starch from the cattail root, simply collect the roots, wash, and peel them. Next, break up the roots under water. The flour will begin to separate from the fibers. Continue this process until the fibers are all separated and the sweet flour is removed. Remove the fiber and pour off the excess water. Allow the remaining flour slurry to dry by placing near a fire or using the sun.

Cattail root flour also contains gluten. Gluten is the constituent in wheat flour that allows flour to rise in yeast breads. The Iroquois Indians macerated and boiled the roots to produce a fine syrup, which they used in a corn meal pudding and to sweeten other dishes. Some Indians burned the mature brown seed heads to extract the small seeds from the fluff, which was used to make gruels and added to soups.

Medicinal and other uses

The medicinal uses of cattails include poultices made from the split and bruised roots that can be applied to cuts, wounds, burns, stings, and bruises. The ash of the burned cattail leaves can be used as an antiseptic or styptic for wounds. A small drop of a honey-like excretion, often found near the base of the plant, can be used as an antiseptic for small wounds and toothaches.

The utility of this cattail is limited only by your imagination. The dried stalks can be used for hand drills and arrow shafts. The seed heads and dried leaves can be used as tinder. The seed head fluff can be used for pillow and bedding stuffing or as a down-like insulation in clothing. The leaves can be used for construction of shelters or for woven seats and backs of chairs, which has been a traditional use for hundreds of years. They can be woven into baskets, hats, mats, and beds. The dried seed heads attached to their stalks can be dipped into melted animal fat or oil and used as torches.

The next time you see "The Super Wal-Mart of the Swamp," why don't you do some shopping?

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Here's the best way to split gnarly firewood

By Jim Deaton

Perfection in splitting troublesome firewood is not accomplished with a splitting maul and wedge or with a gasoline-powered mechanical wood-splitter, but with a chain saw.

Some of us have spent hours and sometimes days splitting troublesome rounds of firewood with countless swings of a maul to hit a wedge that either jumps from the wood and tries to hide from us on the ground, or gets so buried in a crack that it takes us several minutes to remove (and sometimes several oaths). Others have spent the money to buy a gasoline-powered mechanical wood-splitter or borrowed their neighbor's and had to pay for something that "never broke before." A chain saw can do the job not only cheaper and faster but better. Better because you have uniform slabs of wood to build the ends of your firewood stacks.

The first step is to lay rounds of wood side by side (Fig. 1), with the long sides touching, on a level wooden surface (which protects the chain from cutting into the ground or other unfriendly material). Any wooden surface will work, either boards, waferwood, or plywood. If the wooden surface is elevated, so much the better. I started by laying plywood on the ground and rounds on top of that, but later elevated my plywood platform to reduce stooping. A wooden platform on top of a pair of sawhorses will eliminate stooping.

Figure 2. Making little slabs out of big rounds. If a round needs more than one cut, make the side cuts first.

The next step is to place something heavy—like other rounds of wood placed crosswise at both ends of the row of rounds, like bookends—not only to keep the end rounds from rolling off the platform, but to keep enough pressure in the row so rounds do not roll or turn during the cutting.

Using this method, you're not really *splitting* the wood: you're *ripping* it. Ripping wood—that is, cutting *with* the grain in the horizontal position—is faster than cutting *across* the grain. In addition to being faster, it creates a useful by-product: shavings that can be used to mulch around bushes, to construct a meandering trail through a rose garden, or to attractively line a rose garden.

Before you start ripping with your chain saw, your main caution is to **make sure the bottom tooth of the bark-dog is stabbed into the end of the round before the moving chain touches the side of the round** (Fig. 3). If you don't do this, small, light rounds can be pulled rapidly into the end of your saw; while large, immovable rounds can cause your saw to be pulled quite rapidly into the end of the round. This is not particularly dangerous, but it can be alarming if you are not prepared for it to happen.

If a round of wood only requires a cut down the center—through the heartwood—to have two manageable pieces, no problem. But if a round of wood is fair size, as in Figure 2, and will require several cuts to make slabs of wood from two to four inches thick, it is best to make cuts on both sides of the round first. Otherwise, one side will be lopsided, and lopsided things tend to turn, always when you don't want them to.

Figure 1. Lay the rounds side-by-side on a wooden cutting surface, with heavy blocks on the ends.

After the cuts are made and the slabs are looking like freshly-cut pieces of thick bread, the slabs can be laid flat on your platform to be cut into smaller pieces that will resemble rough-cut boards. Usually, additional splitting is not needed, because slabs will fit in most stoves. Besides, wide slabs work well for building vertical ends on your wood pile. Wide slabs can be split later with a splitting maul. A wedge is not needed, because a chop with a splitting maul or heavy axe in the heart of a two- to four-inch thick slab, or along the annual growth rings, will split it without too much effort, to reduce it to a chunk of wood just right for your stove. Δ

Figure 3. Make sure the saw's bark-dog is touching the round before *the moving chain touches the wood.*

Here's how to store LP gas, gasoline, diesel, and kerosene on the homestead — safely

By Emory Warner

Home storage of fuel is a necessity for homesteaders. Even if you are still on the grid, your truck, tractor, standby generator, etc. will still require fuel. I intend to offer appropriate methods of storage for LP gas, gasoline, diesel fuel, and kerosene. I will also offer some tips on safe fuel handling.

Salvaged 275 gallon horizontal fuel tank with hand fuel pump and filter. This type of pump is suited for all fuels; current use is for diesel fuel..

Fuel types

LP gas is one of the easiest fuels to store and also one of the most dangerous. It is a highly versatile fuel which can be used to power internal combustion stationary engines, tractors, and other motor vehicles, as well as for cooking and heating. LP has two serious drawbacks: First, it must be stored under pressure to remain a liquid; any leak (which may not be visible) could leak away all of your fuel without your knowledge. Second, LP is only slightly heavier than air, and will disperse at the exact ratio to produce an explosion. It will also "puddle" in low spots, waiting for an ignition source.

Gasoline has the advantage of being a liquid at room temperature. But it is probably the hardest fuel to store for any length of time. It has a high vapor pressure (which means it evaporates quickly) and will go stale in a few weeks if not chemically treated. It does have a fairly high ignition temperature (about 1100° F) even though it does not need a large volume of heat to ignite. Stored gasoline must be treated with a BHT additive like Sta-Bil and protected from moisture if it is to be stored for any length of time.

Large quantities of gasoline make me nervous. I used to live on the water in southern Maryland, and was witness to several boat explosions and fires due to gasoline vapor in the bilges.

Kerosene is one of the easiest fuels to store, and is more versatile than most people think. It does not evaporate as readily as gasoline and will remain stable in storage with no special treatment. Many pre-1950 farm tractor engines were designed to run on kerosene, and diesels will run on kerosene if necessary. Kerosene stoves and refrigerators are also available and would definitely be preferable to LP models from the safety standpoint.

Diesel fuel stores almost as easily as kerosene and is becoming more and more popular among the self sufficient. It is difficult to ignite intentionally and almost impossible to ignite by accident. Two grades are available: #1 diesel which is old-fashioned yellow kerosene, and #2 diesel which is the same thing as #2 home heating oil. (You may see literature to the contrary, but #2 diesel is #2 heating oil. Period.) Diesel fuel presents its own unique storage problems: The first is that it is somewhat *hygroscopic*; that is, it will absorb moisture from the air. The second and related problem is sludge formation. Sludge is the result of anaerobic bacteria living in the trapped water and eating the sulfur in the fuel. Left untreated, the sludge will grow until it fills the entire tank, ruining the fuel. Stored diesel fuel should be treated with a biocide like methanol or diesel Sta-Bil as soon as it is delivered. Unique to #2 is the fact that some paraffin wax is dissolved in the fuel and will settle out at about 20° F, clogging the fuel filter. This "fuel freezing" may be eliminated by adding 10% gasoline or 20% kerosene to the diesel fuel. Commercial diesel fuel supplements are also available to solve the same problem. Diesel should be filtered before use.

Thirty dollar drum pump mounted on a 55-gallon drum of kerosene. This type of piston pump is not suitable for gasoline.

Alcohol (ethanol) is not commonly considered a storage fuel, but here is the data on it for those who distill their own. Alcohol is as hygroscopic as it gets, and must be stored in a sealed container to prevent moisture contamination. It is about as volatile as kerosene and presents the unique problem, when ignited, of burning with an almost invisible blue flame. It may be best to store the raw material for stilling the alcohol and producing the fuel as needed, rather than producing a large quantity and storing it.

Whatever fuel you store, it would be a good idea to monitor your fuel usage and plan your storage around a 90-day supply.

Safe fuel handling

Regardless of the fuel in question, all liquid fuels should be handled in the same matter as the most volatile, which is either gasoline or LP gas. Fuel should be stored in an isolated area, downhill and downwind from any other buildings. Fuel vapors are heavier than air, and will flow downhill. LP tanks should be left in the open and not enclosed in any way. Liquid fuel tanks can and should be stored in a well-ventilated building or open lean-to to prevent solar heating from evaporating the fuel. If the storage location is permanent, consider using a buried tank. If set below the frost line, temperatures are stable at 55° F or so, which will inhibit evaporation. The tanks will be safe from everything, including stray (or aimed!) gunfire, brushfires, and just about everything else except the EPA. If buried fuel tanks offend your sense of environmental responsibility, then consider an underground vault. This has the added advantage of being able to inspect the tanks from time to time.

Regardless of the tank location, a dry chemical or $C0_2$ fire extinguisher should be hung on the outside of the building or near the pump. Any electrical fixtures should be "explosion proof" (sealed) and wired in sealed conduit to prevent fuel vapors from coming into contact with electrical sparks. Prohibit smoking or carrying of smoking materials within 50 feet of the fuel pumps. Electrical fuel pumps should have a heat sensitive shutoff to stop the pump in the event of fire. Always shut down the engine of the machine being fueled. Promptly clean up any spills. Last of all, be certain to use only the equipment that is approved for the fuel in question. (Some fuel pumps are approved for diesel only, and are unsafe to use for gasoline.)

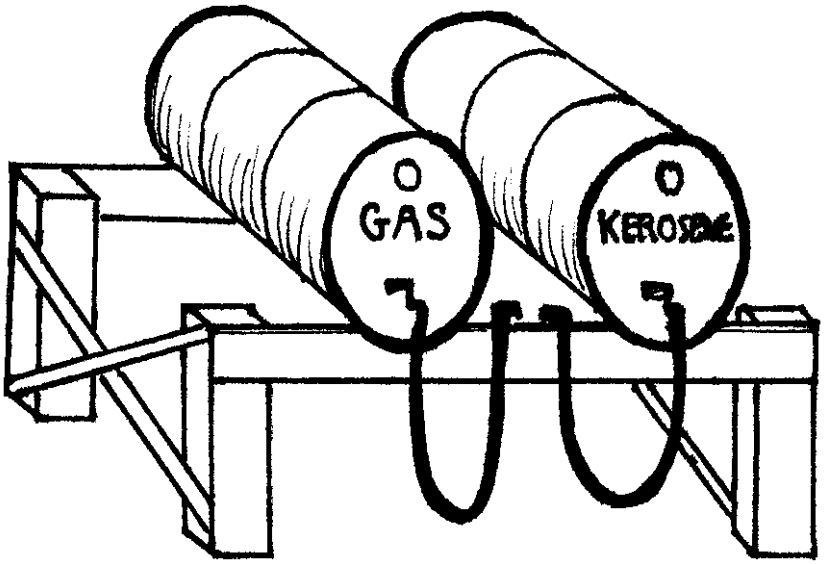
Fuel storage methods

Liquid fuels use the same storage systems and will be covered as a group. LP gas is normally stored in pressurized tanks supplied by the LP dealer, and will be only briefly covered.

The most basic fuel storage system is the common portable fuel can. If you are still on the grid and have a job "off the property," then this is a workable and economical method of fuel storage. A minimum of three cans will be required: one full at all times, one for use as needed, and one to be refilled at the first opportunity. Rotation of the cans will ensure some amount of reasonably fresh fuel at all times. This storage system has the added advantage of portability in the event that the storage site must be abandoned. Use only approved containers, and use caution not to mix up containers. The standard color code for portable cans is blue for kerosene, red for gasoline, and yellow for diesel fuel. This is not cast in stone. Use whatever color scheme you like, but be consistent with it. Gasoline introduced into a diesel tank will make the diesel engine hard to start when hot. Gasoline in a kerosene heater will explode like a Molotov cocktail. Diesel #2 in a kerosene lamp will smoke and stink and soot up the globe. If you use all three fuels like we do, it seems that you will be filling a fuel can every time that you go out. Delivered fuel is much more convenient, and usually cheaper.

The next storage system is the 55-gallon drum used with a hand pump or horizontally on a rack. This is a highly flexible storage system, as drums may be added as needed to suit individual requirements. Most fuel dealers have a 100-gallon minimum delivery, so at least two drums will be needed. You can even load one drum in your truck, drive to the service station and fill it, then bring it home and pump the fuel into your storage drum. Drums are also portable enough in the event that the storage site must be abandoned. The only disadvantages are the negligible cost of the drums and that the drums will eventually rust and leak.

One type of approved and properly marked portable fuel cans.



A horizontal drum storage system. Front and rear 2x6s are notched to hold drums and are bolted to 4x4 posts. Braces are 2x4s. This would be nice to have under a lean-to beside the tractor shed.

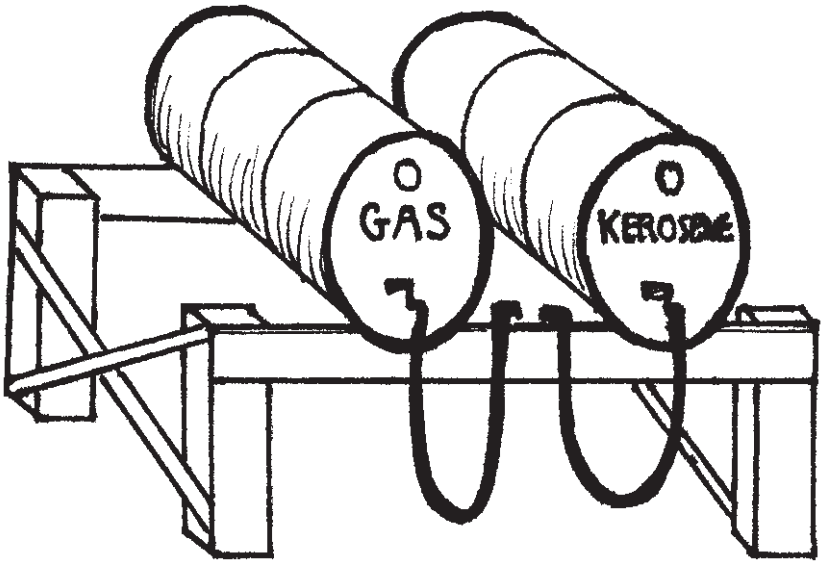
We use drums for our kerosene and gasoline storage. Label each drum clearly if you are storing more than one type of fuel.

If you wish to store large quantities of fuel, then the built-for-the-purpose fuel tank is the system of choice. Tanks are available new in capacities from 100 to 10,000 gallons in above ground and underground types. Most commonly used here in the Northeast is the standard residential 275-gallon fuel tank. These are available new at plumbing and heating suppliers for about $150. Used tanks are usually available free for the hauling, including whatever fuel is in them. As a side note, an individual with a pickup truck and a reciprocating saw could make a fairly decent living removing old fuel tanks as homeowners change away from fuel oil to natural gas. This is about the dirtiest work available, and pays about $100 per tank. The removed tanks could be cleaned up, painted, and resold for $50 or more. I have accumulated about five or six tanks in the last few years without really looking for them.

Fuel dispensing is a matter of choice. An elevated tank needs only a valve and filter; gravity will do the rest. We prefer to use hand pumps for our kerosene and diesel tanks. Valves have been known to leak, and vandalism is an unfortunate reality of modern life—especially if the vandal elects to open the valve on a tank of gasoline and follow it up with a lit match. Hand pumps are safer, and they are more easily secured if the tank must be left unattended.

The author's system

My personal fuel storage system is a salvaged 275-gallon fuel tank with a hand pump and filter for our diesel fuel storage. Our principal tractor is diesel powered. We also use it to operate a PTO (power takeoff) generator for standby use. We use two or three 55-gallon drums for kerosene storage, with a lift pump for dispensing. (We rely on kerosene heaters to supplement our woodstove.) But, as I have a job "off the property," and we have two old gasoline engine tractors, as well as a chainsaw, lawnmower, etc., the fuel can system works well for our gasoline supply. This is particularly suitable for us, as I feel uncomfortable about storing large quantities of gasoline. Δ



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Improve FM and shortwave reception with a do-it-yourself radio antenna

By Charles A. Sanders

Almost all radio listening can be improved with the use of an outside antenna. A radio antenna grabs radio wave energy out of the air, then relays it to the radio receiver which amplifies the signal to an audible level.

AM radio reception usually relies upon an antenna built into the "innards" of the radio. Although some external antennas are available for AM radios, an external antenna will not usually help to pull in weaker signals.

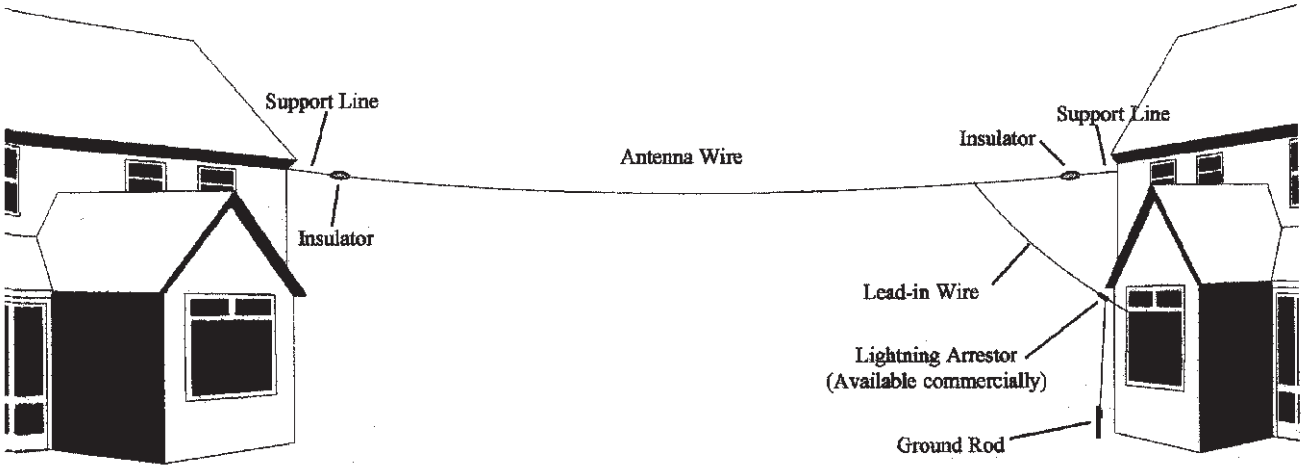
On the other hand, portable FM and shortwave receivers normally come equipped with a telescoping antenna. Many of these radios also have a "jack" (or socket) to attach an external antenna. Attaching an external antenna will greatly enhance the signal-gathering capabilities of these radios.

Ideally, an antenna is constructed so that it can be tuned to the particular frequency it is receiving (or transmitting on). However, for general listening, a simple "long-wire" antenna can be made easily, quickly, and cheaply for just about any FM or shortwave receiver. The antenna described here will pull in a lot of distant stations that were either too faint and scratchy to listen to, or even completely inaudible.

For general listening on FM and shortwave, the length of the antenna itself is not critical. It may be made as long or as short as space will permit. It may be suspended from an outside windowsill to a tree or building by attaching it between two insulators, or merely laid around the baseboard of the room. I have used a length of flat TV lead-in wire as a makeshift shortwave antenna. I just attached it to the terminals on my old Hallicrafter receiver and laid it around the room along the walls. It worked pretty well. I have also seen an effective antenna made by suspending a light-gauge insulated wire with thumbtacks along the walls of a room near the ceiling. These types of "quicky" antennas are especially handy if you live in an apartment, where neighbors might complain, or in other situations where an outside antenna is undesirable.

In a pinch, an unusual makeshift antenna can even be made by making up a length of insulated wire with an antenna plug on one end and about three or four inches of bare wire on the other. Insert the plug into the antenna jack on your radio and wrap the bare wire around one of the strands of barbed wire fencing on your place. You will instantly have an antenna considerably longer than any you can construct—a real "long-wire" antenna.

As you can see, the antenna arrangement can be made very cheaply and easily. The illustration depicts the construction of a more permanent long-wire antenna suspended between two insulators. Commercial glass insulators are readily available and inexpensive, or you can make effective substitutes by using a couple of pieces of PVC pipe from the scrap pile. The important thing is to separate the antenna wire itself from the support line.



A simple long-wire antenna setup

Copper wire makes the best antenna. The wire used for both the antenna and the lead-in can be the same size, usually 12, 14 or 16 gauge. Try not to use solid-core wire. The long-term effects of wind and weather can take their toll on lighter wires, and stranded or braided wire will provide the best durability.

Another important item is to be sure to use a lead-in wire that can be attached to your radio. Visit the local radio supply store and purchase a plug which will fit the antenna jack of your radio. These plugs are inexpensive and easy to use.

Since the lead-in wire will likely be run over a windowsill or otherwise come into contact with other surfaces, it must be made of insulated wire. It cannot come into contact with anything which will absorb the energy of the radio signals. If you use a separate antenna wire and lead-in wire, be sure to carefully cut away any insulating covering, then twist the two together, bare wire to bare wire. It is best to then solder the connection and securely wrap it with weatherproof electrician's tape. In a pinch, you can get by without soldering the wires together.

As seen in the illustration, a short piece of support line is anchored near the site where the radio is located (in most cases, the outside wall of the home). An insulator is then secured to the free end of the short line. Next, the antenna wire is secured to the insulator. You may either secure the end of the antenna wire and attach the lead-in wire later, or simply provide one piece of wire long enough to serve as both the antenna and lead-in wire. Using one piece of wire will eliminate the need to solder or wrap the lead-in wire to the antenna wire. In either case, the wire is attached to the insulator to separate the antenna wire from the support line.

Out on the far end of the antenna wire, attach another insulator. Then attach another piece of support line to the free end of the insulator. Run the support line to a tree limb, pole, another building, or other support. The whole assembly does not need to be suspended too tightly, but hang it high enough so it's out of the way. In fact, the higher and longer the antenna is, the better the reception will be.

Be sure to run a ground wire, routed through a lightning arrestor, from this suspended antenna. It is obvious that in the event of a lightning strike, it is better for the million-some-odd volts of electricity to go to ground than to come leaping out of your radio. Use a six- to eight-foot copper or brass rod and drive it in a good five to seven feet into the ground. Firmly clamp one end of the ground wire to the rod and secure the other end to the lightning arrestor. It in turn is connected to the lead-in wire. (The lightning arrestor *won't* conduct small currents to your grounding rod, but it *will* ground out a lightning strike.) This arrangement will provide some cheap insurance and considerable peace of mind.

When selecting a site for your outside antenna, remember that the antenna picks up best those signals which come in at a right angle to its length. In fact, it is a relatively simple matter to construct two of the long-wire antennas described in this article and place them at right angles to each other. If you do this, you can connect both antennas to your lead-in wire, but you may find some "clutter"—that is, weak stations crowding in on the station you're trying to hear. If that's a problem, you can add a switch to the setup, so you can switch from one antenna to the other.

It is also important to place the antenna away from sources of electrical interference. That may include power lines, transformers, thermostats, TV sets, fluorescent lights, electric motors, electric fence chargers, and even passing automobile traffic. Rheostat switches such as those used on household light dimmer switches will also wreak havoc with radio signals if close by. Electrical storms will also disrupt your reception. And remember, when erecting your antenna, ***never cross over or under power lines*** with it.

If you want to enhance your radio set's reception, consider trying an external radio antenna. Whatever your location, I think your set's performance will be improved. Δ

Homesteading on the electronic frontier

By Martin Waterman

Solar, wind, and other independent energy information can be found on the Internet

Whether you are on or off the grid, you may have an abundance of untapped energy on your property waiting to be harnessed. At the Very least, there are many ways you could be saving energy by using different construction and renovation methods. With the Internet, you can quickly find hundreds of useful sites pertaining to renewable energy sources such as wind, water, and solar power as well as information on saving energy by using heat pumps or just common sense.

Alternative energy and energy conservation used to be a hot topic during the energy crisis of the early 1970s which coincidentally ended when interest in alternatives to fossil fuels peaked. There has been a great deal of progress in the last few decades, and apparently systems have become much more efficient and viable. I have listed but a few of the sites that are worthy of attention.

Useful sites

http://www.aral.com/enrenew.htm is a site packed full of renewable energy links to companies that specialize in solar, wind, and hydro power. There are also links to organizations and the latest news and information. This is an excellent place to start out, especially if you want to gather information and prices on materials or systems. There are over 150 links, and most of them are companies that market various energy-generating and energy-saving equipment.

http://www.afdc.doe.gov/ is the Alternative Fuels Data Center (AFDC) which claims to be the nation's most comprehensive source for information on alternative fuels. The AFDC is operated by the National Renewable Energy Laboratory (NREL) with funding and direction from the Office of Alternative Fuels within the Office of Transportation Technologies at the U.S. Department of Energy (DOE). The AFDC collects operating information from vehicles (in programs sponsored by the Alternative Motor Fuels Act) running on alternative fuels, analyzes those data, and makes them available to the public. The AFDC also maintains information on research reports conducted for both the Biofuels Systems Division and the Fuel Utilization Data and Analysis Division of the DOE Office of Alternative Fuels.

This is an interesting site, particularly the alternative fuels Web site statistics and useful links, including those to the DOE and to the NREL.

http://nwtc.nrel.gov/ is the National Wind Technology Center, which is operated by the NREL. Before you go thinking that this is just another government agency blowing hot air (and taxpayer dollars), the site has a great deal of easy-to-understand information on wind research and wind power. If you are just starting out on the learning curve, there is a great deal of basic information. Of course, there is also much here for those requiring advanced information. I did have a problem with the site. Whoever created the site went overboard with the graphics to the point where it is slow to load.

http://www.igc.apc.org/awea/ is the American Wind Energy Association (AWEA). This is the trade organization for the wind energy industry. The site offers a publications catalog, a Frequently Asked Questions (FAQ) document, articles from the Wind Energy Weekly newsletter, a catalog of wind energy publications, a list of small turbine manufacturers, policy issues (that almost always reflect a pro-alternative-energy agenda), information on utility restructuring, and news releases on topics important to the future of clean energy. Since 1974, AWEA has been involved in wind energy as a reliable energy alternative.

For those who are really in search of hard core info, there is also much technical information. There is also information on Windpower '97, AWEA's annual conference and trade show, as well as links to other related sites. Their e-mail address is windmail@mcimail.com.

http://www.realtime.net/-gnudd/~react/epsea.htm is the home of the El Paso Solar Energy Association (EPSEA), which was founded in 1978 and is the oldest continuously active local solar organization in the United States. EPSEA publishes a monthly newsletter on solar energy and EPSEA activities.

The purpose of EPSEA is to further the development and application of solar energy and related technologies with concern for the ecological, social, and economic fabric of the region (West Texas, Southern New Mexico, Northern New Mexico).

There is some very practical and free information on this site. For instance, if you are thinking of building or renovating a home, there is information on passive solar and energy-efficient home design. To quote, "It is a fact, that everything we build is solar. When we ignore solar energy during the design stages we end up

with a building which may benefit from solar, though it is just as likely to be beat up by solar energy." The guidelines cover orientation to the sun, avoiding blockage by trees and other obstructions, formulas for amount of glass as a percentage of total square footage, glass formulas for each side of the house, proper landscaping (planting deciduous or evergreen trees on the east, west and north sides of the home), insulation formulas, and general construction information. You can go directly to this page at **http://www.txses.org /epsea/design.html.**

bttp://www.eeba.org/ is the home of the Energy Efficient Building Association, Inc. (EEBA). This is an international non-profit group dedicated to fostering energy efficient design and construction, and environmentally responsible development practices that provide quality living environments. EEBA promotes environmentally respectful development through development and dissemination of information and conducting training for use by the housing industry, consumers, and governmental agencies. They have a bookstore and a list of publications that may be beneficial for those looking to save energy in their new buildings.

One of the best things about the Internet is that you can get news and new information before it is old. There are many universities, colleges, and organizations involved in alternative energy research, and finding out the latest studies and technologies is just a point and a click away. If you go to **http://www.esl.tamu.edu/** you will end up at Texas A&M's Energy Systems Laboratory. This lab is used for studies of energy conservation and heating, ventilation, and air conditioning within the Texas Engineering Experiment Station in the Texas A&M University system. The laboratory is one of the largest university-based research programs of its kind in the United States. One of its principal projects is the Texas LoanSTAR Program, a State Energy Conservation Office program designed to "Save Taxes And Resources" by monitoring energy use and recommending energy-saving retrofits.

When you consider that many individuals have home pages that mention solar, water, or wind energy, there are thousands of sites that can be useful.

Another benefit of the Internet is that not only can you obtain a great deal of accurate and up-to-date information, you can also e-mail questions to users and get first-hand information and feedback.

Virus alert

What is the most important part of your computer? The hard drive? Your CPU? Your RAM? Your files? If your computer is vulnerable to a virus, all of the above could be rendered useless. Just imagine for a moment what it would mean to lose all your files as well as have your hard drive turned into a piece of scrap metal. How long would it take you to get up and ruirining again? How much time and how much money would it take even if you religiously back-up your files?

Computer viruses are a serious problem, so much so that in some businesses, introducing a disk that could be infected could cost you your job. If all your software comes in shrink-wrapped plastic direct from the computer shop, the chances of your computer catching a virus is quite low. However, the famous Michelangelo virus actually found its way into some commercial software. This particular virus spreads quietly until March 6th and then overwrites the information on your hard drive with random characters.

Today's modern viruses can attach themselves to e-mail files and enter your system totally undetected.

If you are like most users-that is, you share files, are on the Internet, receive e-mail, and download files or programs-the chances that you may be hit with a virus increase dramatically. This means it is highly advisable to practice safe computing in the 90's, and this means protecting your computer and your business from these attacks.

I have been fortunate never to have had a virus. However, friends and business associates of mine have had their systems down and damaged by these virus attacks. In some instances, the virus has resulted in losses of thousands of dollars because files have to be keyed in all over again.

Simply put, the computer virus is a program designed to replicate and attach itself to programs. Depending on the programmer who created it, the virus can do damage by corrupting programs, playing pranks, deleting or changing files, displaying political or pornographic messages, or destroying or reformatting your entire hard drive.

No computer should be without a virus checking program to find, correct, and delete these parasitic programs. There are over 10,000 known computer viruses, and as you read this, no doubt new ones are being spawned out of demented programmers' minds.

One of the best known anti-virus programs is Norton AntiVirus. It is available for different operating systems, including Windows 95 and Windows NT, and there is also a network version. Norton's AntiVirus program can be updated monthly by simply downloading a file from the Internet. Of course, disks can also be ordered.

There seems to be a new rash of computer viruses striking lately. It seems that after all the publicity associated with Michelangelo, many users have let down their guard. This, combined with the newer generation of polymorphic and boot viruses, makes it more important than ever to practice preventative maintenance. In the case of a computer virus, an ounce of prevention can save you a ton of expenses and headaches.

(Martin P. Waterman can he reached at waterman@mailserv.nbnet.nb.ca.) Δ

Ayoob on firearms

By Massad Ayoob

Teaching your lady to shoot

By Massad Ayoob

Backwoods Home Publisher Dave Duffy wants his wife to learn to be comfortable with a handgun. Cougar attacks on humans are increasing in the region where she walks with their kids. Makes sense to me. Dave asks, "How do you teach your wife to shoot?" My best answer would be, "By making an appointment for her with an instructor."

Teaching your wife to shoot is like teaching your spouse to drive. If you're like most of us, marriage is a partnership of equals. That relationship of equals is tilted out of balance when one becomes the teacher to the student, the parent to the child as it were.

It works in reverse. My wife and I went through the same thing when she tried to teach me computers. We both gave up in frustration. She learned to shoot, long ago, from my gun club's pistol team, and I learned computers (if "learned" is the word at my present stage of computer literacy) from a hired consultant. It worked out better that way.

Had we needed the skills acquisition simultaneously, trading each hour on the range (I teach her) for an hour at the terminal (she teaches me) would have worked. Another possibility is that shooting is something you both need to learn. This is ideal: go to class together.

This worked great for two friends of mine, Otto and DeeDee Orive. They went to their first basic class together, and today share not only a hobby but a lifestyle. Otto went on to become a cop and one of the top police firearms instructors in the Pacific Northwest, while DeeDee is also a firearms instructor. Both are splendid shots.

I've seen DeeDee outshoot Otto, and it's not a unique phenomenon. Firearms instructors almost unanimously agree that female students have a much faster learning curve than males. Part of it is that there is no subconscious baggage of an alpha male learning something with macho overtones from another alpha male. I think there's also an inherently better fine motor coordination at work. There's also an attitude difference, most starkly seen when teaching children firearms safety. Young boys react to their first firing of a gun with, "Wow! It's loud! It kicks! And it's a grown up guy thing!" Young girls are more likely to respond with, "If I do this exactly right, I can put every bullet in the same exact place. Neat!"

When a bonded couple attends a class with me at Lethal Force Institute (call 1-800-624-9049 for class information), I generally put them on different ends of the firing line. That way she doesn't have to worry about performing in a way that pleases him, and he doesn't have to worry about shooting well enough to impress her, and they can proceed with learning at their own pace much more naturally.

One who agrees with spouse not teaching spouse is Gila May-Hayes, author of the book Effective Defense: the Woman, the Gun, the Plan. She was trained by her husband, Marty Hayes, and then developed the relationship that led to their marriage. Together, they run the Firearms Academy of Seattle (call 1-800-FAS-AMMO for class information), and

Massad Ayoob

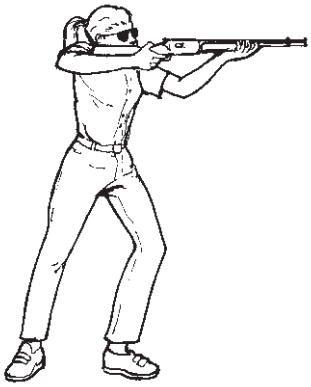
Gila advises, "Get the training from professionals."

If a firearms academy per se is not available in your area, ask local cops, conservation officers, and gunshop proprietors who the people are in your area who are (a) highly competent with firearms, and (b) capable of transferring that knowledge. (Being a good practitioner doesn't necessarily make you a good teacher.) You might even have skills you can barter with the local instructor for true "backwoods living values."

Gender differences

None of this is to say that the male can't teach the female in his life, or vice versa for that matter, only that it can be more difficult. But both teacher and student will have to know what professionals know about what firearms and shooting techniques best suit typical female sizes and learning attributes.

You wouldn't teach someone five feet tall to drive in a car whose seat was set for a six-foot-six driver. Don't teach someone to shoot with a gun that's too big for them. This isn't a "women's issue"; rather, it's an issue



The "aggressive forward" stance is more stable for a small shooter.

of physical size and proportional hand size vis-a-vis firearms that impacts women disparately because they tend to be shorter-statured with smaller hands than the "average adult male" most firearms are designed to fit.

On a rifle or shotgun, the critical measurement is *pull length* of the stock. The rule of thumb is this: If she grasps the empty shotgun or rifle with her finger on the trigger, and the buttplate or recoil pad comes just to the crook of her elbow, it will fit her; if it's longer than that, it won't. A too-long stock will force her to cantilever her shoulders back to hold it up, taking her so far off balance that recoil will kick her around, and she won't be able to get the proper eye position to use a telescopic sight.

On a handgun, the key measurement is *trigger reach.* She wants to be able to put the empty pistol or revolver in her hand with the gun barrel directly in line with the long bones of her forearm, and be able to reach the trigger with (ideally) the farthest (distal) joint of the trigger finger, or at least the pad of the fingertip. If she can't do that, she'll have to crook her hand around the gun to work the trigger in a way that will compromise her grasp. Shooting that way can hurt her hand, and she won't have good control of the gun.

Most American manufacturers make rifles and shotguns with "youth stocks" for shorter-statured persons with shorter arms. Any long gun's wooden stock can be cut down to fit.

The bargain-priced SKS military rifles imported from China and Russia tend to have shorter stocks than American guns, in the one case to allow for smaller-statured Asian males and in the other to allow for heavy Russian winter military uniforms. They fit women well, particularly the "paratrooper" models, and with American-made softnose ammo, their 7.62 x 39 cartridge is comparable in power to that favorite of deer hunters, the .30/30.

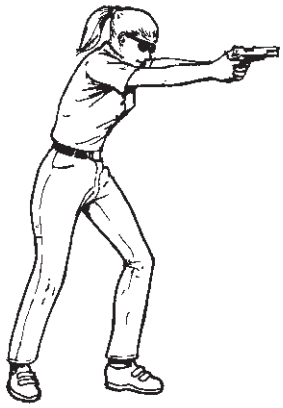
In a bolt-action rifle, a light .243 like Remington's Model 7 makes enormous sense.

In handguns, short-trigger-reach autoloading pistols that are ideal for petite women include the powerful 1911A1 .45 (yes, they can handle the recoil), the 9mm or .40 caliber Browning HiPower, and if price is no object, the HK P7M8. Revolvers especially well suited for small hands include the Smith & Wesson J-frame series in a variety of calibers from .22 to .357 Magnum, the Ruger Sp-101 in a similar caliber range, the new Colt SF-VI .38s, and the smaller Taurus models. Of course, if she has long fingers, you don't need short-reach triggers. My oldest daughter, five-nine with proportional hands, used the long-reach Beretta 9mm to place High Woman at the 1996 National Tactical Invitational.

Shooting positions

You also want to emphasize shooting positions that don't need the typical male's upper body strength. Your wife doesn't have your biceps, but pound for pound she's stronger than you in the legs, so let her shoot the long gun with an aggressive forward stance. Her sharply flexed leading leg takes proportionally more of the weight and stabilizes her better.

With a two-handed pistol stance, instead of the muscle-tone-intensive Weaver posture with its isometric push-pull, let her use the skeletal-support-intensive Isosceles stance, with her arms locked straight out in that same aggressive forward stance we talked about, with her powerful leg muscles taking proportionally more of the outboard weight of an extended firearm.



An isosceles stance with the aggressive forward stance offers stability.

Encourage her to use stable positions like kneeling or sitting, which in all probability she can do better than you. Women have about 30° more flexibility in the pelvic axis than men, and lower centers of gravity even irrespective of relative height. The competition rifle shooter's sitting position makes me want to cry out for a chiropractor, but my daughters sit this way by choice when they talk on the telephone.

The relative difference in upper body strength means she'll appreciate a lighter gun than your favorite, and perhaps one that kicks less than yours. As with any new shooter, start off with a .22 for its negligible recoil and mild sound report, and work the student up through the calibers as she (or he) becomes accustomed to shooting. Starting off with a too-powerful gun is always a bad idea.

Good luck. More women than ever are becoming involved in the shooting sports, and are acquiring firearms for personal protection. It's an idea whose time has come, a statement of female empowerment that has been long overdue. Δ

Here's a cabbage with class — Early Jersey Wakefield

By Alice B. Yeager
Photos by James O. Yeager

When considering what to plant for an early yield in our garden, there is a variety of cabbage that always comes to mind: Early Jersey Wakefield. Over the years it has earned a reputation of being one that will succeed for us where some others have failed.

Living in Southwest Arkansas (Zone 8) where heat and humidity play a big part in our gardening decisions, we need a cabbage that matures before the threat of hot weather. Early Jersey Wakefield meets the challenge and gives us something to anticipate. It's a cabbage with quality and class, and a good keeper that lasts several weeks when refrigerated. Coleslaw made from this cabbage is sweet, with no hint of heavy flavor or bitterness. Heads are pointed and average about two to three pounds apiece. Texture is crisp and tender—great for making kraut. Side leaves are good for cabbage rolls.

By trial and error, we have learned that some of the later-maturing varieties, like Savoy King Hybrid or Copenhagen Market, sound good in the seed catalogs, but don't perform well here. They seem to be subject to sun scald and splitting. They would probably do better farther north in a cooler climate.

Cabbage plants need moderately rich soil and plenty of sunshine to reach their full potential, but cabbage is a cool season crop, and plants should be set out as early as the ground can be worked, after danger of a heavy freeze has passed. Our garden soil is rich in humus, being the dumping ground for an endless supply of leaves and pine needles. To this we add chicken litter during fall and winter, and it all comes together to produce a soil that will grow almost anything within reason.

A mature head of Early Jersey Wakefield cabbage. At this stage it makes excellent coleslaw, sauerkraut, soup, etc. Some of the side leaves may be used for cabbage rolls.

Cabbage requires a soil with pH of 6.0 to 7.0, making it a suitable vegetable to grow in most fertile garden soils. To develop good heads, cabbage needs a moderate amount of moisture but doesn't like boggy locations.

Planting

Our plants are started from seed in a cable-heated seed starter in our small greenhouse while winter winds are still blowing around outside. After the seedlings have produced a second set of true leaves, we move them out of the starter to small individual plastic pots filled with a good quality potting soil. (We once used peat pots, but quit when prices soared.) Young plants are watered with a liquid plant food and remain in the greenhouse until it's almost time to be transplanted to the garden.

In order to avoid sun scald from outside exposure, we harden off plants by placing them in a spot protected from wind where they will receive direct sun for a couple of hours each day, gradually increasing exposure until they can take all-day sun without having their leaves damaged.

Cabbage variety determines spacing of plants in the garden. As a general rule, early-maturing varieties are planted closer together than varieties that have larger heads and need more room and time to mature. We space Early Jersey Wakefield plants about 18 inches apart in rows about 2½ feet apart. Cultivation is virtually unnecessary, as we surround the plants with a light organic mulch, gradually adding more as the plants grow. Occasionally a stray weed or bit of grass will appear, but the mulch keeps them from being strongly rooted, and they are easy to pull up.

Young cabbage plants will endure cooler temperatures than many spring plants. Generally

a light frost will not harm them. If temperatures are predicted to dip into the mid-20s or below, however, we take no chances, but cover the plants with plastic flower pots, Hotkaps or whatever is handy to protect them. Metal conducts cold, so no plants should ever be covered with metal cans, buckets, etc.

It is well to remember to rotate garden crops. That is to say, don't continue to plant the same thing in the same spot year after year. If there are any diseases connected with a plant group, chances for having problems with those diseases will be increased. Cabbage is subject to clubroot, a fungus disease affecting all members of the Crucifer family (cabbage, broccoli, Brussels sprouts, cauliflower, etc.) Plants wilt during daytime and recover at night. Older leaves yellow and drop off, and roots become swollen and distorted. This fungus can live for years in the soil, but rotating crops will minimize chances of having to give up planting any of the crucifers.

Head 'em up! Young Early Jersey Wakefield plant beginning to form a head.

Pest control

Different parts of the country have diverse concentrations of pests to confront when it comes to raising cabbage or any other vegetable. Flea beetles, cutworms, slugs, snails, cabbage worms, etc., all share our love for cabbage. With the exception of flea beetles, most of these will find their way into the cabbage heads, where they are not discovered until the cabbage is harvested. The best method that I have found for getting rid of slugs and snails before they zero in on the cabbage is to place shallow pans of beer (rims even with the ground) in the cabbage patch. The interlopers don't seem to mind whether cheap or expensive beer is served and will literally drown themselves. You can also buy traps and baits from gardening supply companies.

Diatomaceous earth, with its silica-like texture, is a good defense against pests with soft bodies, such as slugs and cutworms. Earthworms are not affected, probably because they are not surface dwellers. DE is most effective when the ground is not too moist. Showers render it useless.

I do not like to resort to inorganic methods for controlling pests, but if I find that sowbugs and cabbage loopers are having a heyday with our cabbage plants, I resort to five or ten percent Sevin dust. Sevin is death on sowbugs and other leaf chewers. If the looper infestation is light, I eliminate them by hand picking.

Needless to say, cabbage is good for you. It has an abundance of vitamins and minerals and is low in calories. An entire meal can be based on steamed chunks of cabbage, onions, potatoes, and carrots seasoned with a bit of oleo, pepper, and bits of ham. Served with a pan of piping hot cornbread, this steamed mixture lets you know a gardener's life can be downright rewarding.

Seed sources

Most seed companies list Early Jersey Wakefield.

Savoy King Hybrid:

Thompson & Morgan, Inc.
P.O. Box 1308
Jackson, NJ 08527-0308

Copenhagen Market:

Gurney's Seed & Nursery Co.
110 Capital Street
Yankton, SD 57079 Δ

Playing Poker

The cards fall in the night
With neither prejudice nor pattern.
But I look around the table
And I believe the others are here
To find God
And elicit from him some favor,
Or a hint,
Or just a smile from eternity
That will show up for them
in the cards.
Smoke hangs over the table
Like celestial clouds,
And chips click like rosary beads.
It makes me uncomfortable.
But I am here because I believe
I can impose my will
On a luckless and godless
universe,
And rule my own destiny
And fashion rationality
And buck the never-ending
entropy
And mold meaning out of the dis
order
The way a sculptor carves
meaning
Out of lifeless stone
And leaves a statue
Where only a rock
Had been before.

Deal.

(Reprinted from the book, Sex and Sins in the Cemetery, by John Silveira, available from *Backwoods Home Magazine*.)

Make your own Old World culinary delights

By Richard Blunt

As the years go by I find myself more and more out of step with the incessant noises, signs, and fast moving trends our onrushing society imposes on me. Every time I go into a supermarket I feel more like a victim of mass production and mass merchandising than I do a shopper with my own desires and tastes. Walking up and down the maze of aisles, cluttered with processed foods stuffed into strange colored cans and boxes, I feel out of place. I have difficulty registering any connection between the food on the shelves and the land from which it came. I leave the market with a feeling that I have lost another link in the chain that connects me to the basic culinary arts that have been my mainstay since childhood.

This issue I will share with you some of my childhood experiences with Old World culinary crafts, and the simple recipes I've learned that have kept me connected to a culinary heritage that has otherwise almost completely disappeared in this country.

I spent my early school years at a small parochial school in one of Boston's largest suburban areas. At that time almost every Catholic parish in Boston's suburbs had its own elementary school. The size of the parish along with the economic status of the parishioners determined how well equipped the school would be. My mother and I lived in a small parish that was made up of a diverse mixture of working class families. The parish didn't have a lot of money and most of the families had children attending the parish school. This created a space problem that could only be solved by converting the cafeteria into classroom space.

For some reason the teachers would not allow the students in the sixth, seventh, and eighth grades to eat lunch at our desks, so we were sent home for lunch each day. We left school at 11:30 a.m. and were expected back to resume classes at 12:45 p.m. Unfortunately, I lived far enough from the school to make this daily trip an exercise in endurance. In good weather (no rain, snow, hurricanes, floods, or tornados) I could hurry home and, with little time to spare, eat my lunch, then return to school within the time allotted. It wasn't easy. Fortunately, my mom recognized the seriousness of my problem from day one and made arrangements for me to eat lunch at the homes of kids who lived closer to the school then we did. The neighborhoods close to the school consisted mainly of Irish, Scot, Italian, and Greek American families. Some of the moms in this area were active members of my mother's weekend holiday bake shop (see my last column) and also worked with her on various church projects. Lucky for me, they were all great cooks and took the preparation and service of lunch to us kids seriously.

Richard Blunt

The lunches served in these homes would be considered unusual by today's standards because the kitchens were controlled by women who prepared foods according to Old World traditions. The main theme was wholesome food prepared in an economical but elegant fashion, with little or no waste.

Mrs. Tassalari once served a leftover Moussaka casserole, baked with a sauce made with fresh home made yogurt. My taste for homemade Greek food was fixed from that day on.

Mrs. Troiano always had a hearty pasta dish for lunch, and she never served me the same sauce twice in a row. My favorite was a sauce made with home cured green and black olives, fresh mushrooms, and fresh herbs from her garden, all marinated in a light olive oil.

Mrs. Griffin always served cold sandwiches and soup, but the sandwiches were not the peanut butter and jelly type that are so popular with kids today. Her sandwiches were made on a variety of homemade whole grain breads, embellished with one of several English cheeses, braised fresh brisket, roast turkey, or sliced roast pork. All sandwiches were enhanced with a fiery homemade malt whiskey mustard that would take your breath away at first bite.

My mother often served salads made with fresh greens tossed with blanched and raw vegetables and an English cheddar cheese she bought from Mrs. Griffin. These salads never contained lettuce. When I asked why, she replied, "lettuce is rabbit food." She made her salad dressings with her own home-fermented apple cider vinegar, or malt vinegar (made from a strong beer or ale), that was better than any vinegar you can buy in a gourmet store today.

If an Old World culinary connection of the kind that used home cured olives—such as Mrs. Troiano made—marinated in the dressing of your choice, or homemade mustard—like Mrs. Griffin made—that can be custom blended to satisfy any taste, sounds interesting to you, read on, relax, and take a little time to enjoy some of the Old World culinary arts that were once the mainstays of family kitchens.

Brine cured green olives

If you live near the Great Central Valley of California, finding fresh olives for curing will not be a problem. California has over 35,000 acres of olive trees, and picking fresh olives in the fall is similar to picking apples on the East coast. If you live elsewhere, most Italian and Greek markets start stocking the best green olives in October. The best black—or ripe—olives start arriving in late November and continue in stock through January.

Unlike other fruits, olives cannot be eaten raw from the tree. They contain a bitter glucoside called oleuropein which must be removed by processing to make them edible. I'm going to introduce you to a brine curing process. It is safe, simple, and produces a finished olive that is full of flavor without being bitter. This isn't the only method for curing olives. Others methods include, dry salt curing, lye curing, and fermentation with lactic acid. These are methods that are worth exploring at another time as each produces a finished olive with a different taste. You can cure as many olives as you like. I have a full flat (about 16 pounds) curing as I write this column. Just keep in mind that this is a curing process, not a preserving process. The finished olives will be safe in brine for about a month. After opening they must be refrigerated and consumed within a couple of weeks.

Ingredients for Primary soak:

2½ pounds dark green olives
Cold water for primary soaking

Method:

1. Place the olives in a large plastic or stainless steel bowl add enough cold water to just cover. Place a plate on the olives to prevent them from floating.

2. Change the water every day for 10 days. This prevents fermentation from setting in. During this period, and the brine curing process that follows, store the olives in a cool, dark place.

Ingredients for brine solution:

1 cup sea salt or kosher salt
1 gallon bottled spring water
1 whole head of garlic, unpeeled
4 bay leaves
2 tsp whole coriander seeds (Buy these in bulk at an ethnic market where they can be purchased cheap.)

Method:

1. Heat the spring water over a medium heat to just below the boiling point. Remove the water from the heat and stir in the salt until it is dissolved.

2. Add the garlic head, bay leaves, and coriander seeds and allow the brine to cool.

3. When the brine has cooled to room temperature, cover the olives with the cooled brine and return them to a cool dark place.

4. Each week for the next five weeks drain off the brine and repeat steps 1 through 3. On the sixth week strain the olives from the seasoned brine and prepare weaker unseasoned brine solution.

Ingredients for unseasoned brine:

½ gallon bottled spring water
¼ cup sea salt or kosher salt

Method:

1. Heat the water to just below the boiling point, stir in the salt, and let the mixture cool.

2. Transfer the olives into two sterilized quart-size canning jars and add just enough brine to cover. Seal the jars and return them to a cool dark place until you are ready to eat them.

When will my olives be ready?

The whole process should take about three months. Let your own taste be the judge. Rich olive flavor without bitterness is the key.

How should I serve my home cured olives?

Try this. Remove the fully cured olives from the brine and rinse them in plenty of cold water. Dry them completely and marinate them in the refrigerate in your favorite olive marinade.

If you don't have a favorite olive marinade (which, at this point, is quite likely), try this one. This is a dressing that Mrs. Tassalari always made for the olives that she used in her favorite Greek salad. It was a perfect match for the sharp flavors of her feta cheese and Kalamata olives.

Garlic herb olive marinade

Ingredients:

½ cup extra virgin olive oil
½ tsp English mustard powder
4 cloves fresh garlic, minced fine
2 tsp dried oregano
½ tsp dried red pepper flakes
¼ tsp ground cumin
½ tsp lemon zest
½ tsp ground coriander
1 Tbsp dried cilantro

Mustards

The Mount Horeb Mustard Museum in Wisconsin has over 1700 types of prepared mustard in its collection. Horseradish, garlic, chilli peppers, honey, hard cider, fruit brandies, numerous spices and even peanuts are added to prepared mustards as custom flavor and texture enhancers. So, if you have any preconceived notions about just how mustard should taste, the world of mustard holds many surprises for you. Creating the perfect imitation of Grey Poupon is not the ultimate success when making your own mustards. The real success is having fun with the endless variety of tastes and textures that this true culinary craft offers it's practitioners.

There are three types of mustard seed, yellow, brown and black. All three of these seeds can be purchased in any East Indian grocery store at good prices because mustard seeds are standard ingredients in Indian cooking. Black and brown mustard seeds are used to make the most pungent commercial mustards. Yellow seeds are the primary ingredient in mild "hot dog" mustards.

Mustard seeds are somewhat mild and uninteresting until you break the shell of the seed and add liquid. Once the endosperm is wetted, the chemical reaction between enzymes and other compounds in the seed form the pungent mustard oils. I mention this not for scientific reasons but to let you know that the most important phase in preparing mustards is the addition of the liquid ingredients. The success or failure of a prepared mustard depends on what you, the craftsman, thinks of the taste. Before you add a new and unproven liquid to your mustard, place a small amount of the powdered dry mustard in a dish and add some of the liquid. Give the mixture about one hour to develop its flavor, then taste. You'll know then if you want to mix a larger batch.

While you are experimenting, crush a few of each type of seed and see if you can tell the difference between them. Also add a little water to each type of mustard powder that you intend to use (yellow, brown, or black) and let the flavor develop and taste the difference. It should be considerable. I know it sounds like a lot of work but by taking a little time to test your main ingredients in the beginning, you will save yourself a lot of disappointment later on.

Let's make mustard. This is a favorite mustard in my house. If the mustard is intended for a mixed group (children and adults) I cook the whiskey to remove the alcohol.

Highland Malt Mustard

Ingredients:

- ½ cup brown mustard seeds
- ½ cup yellow mustard seeds
- 4 Tbsp water
- ½ cup honey
- 2/3 cup cider vinegar
- 1 Tbsp fresh ground nutmeg
- 1 Tbsp kosher salt
- 2/3 cup single malt Scotch whiskey (Use Scotch for a full body and smokey flavor. For a lighter flavor substitute Irish or Canadian whiskey. For alcohol-free, substitute fresh apple cider.)

Method:

1. Grind the brown and yellow mustard seed together to a desired consistency in a blender. Some people like a coarse mustard and some like it smooth. It's up to you when you grind it.

2. Mix the processed seeds with the water in a glass or stainless steel bowl and let the mixture stand covered for one hour.

3. Combine the mustard mixture, honey, vinegar, nutmeg, salt, and whiskey (or cider) in the blender or food processor. Process until the mixture forms the desired consistency. Add more honey if the mixture looks dry.

4. Transfer the mixture to a glass or stainless steel bowl, cover and let stand for 24 hours.

5. Pour into sterilized 4 ounce jelly jars and process in a boiling water bath for ten minutes. Store in a cool dark place for three weeks. Refrigerate after opening.

This will yield about 10 four ounce jars (about 2 ½ cups).

Well that's enough for this column. In future columns we will discuss home brewed vinegars. We will also learn to make, age, and enjoy some wonderful English and French cheeses at home. I find an overabundance of how-to books on wine making but very few on how to make real apple cider, and none on how to make pear cider. These and other culinary arts, that are now residing in the shadows, will be brought into the sunlight. Δ

Just for kids — Fairies in your garden

By Lucy Shober

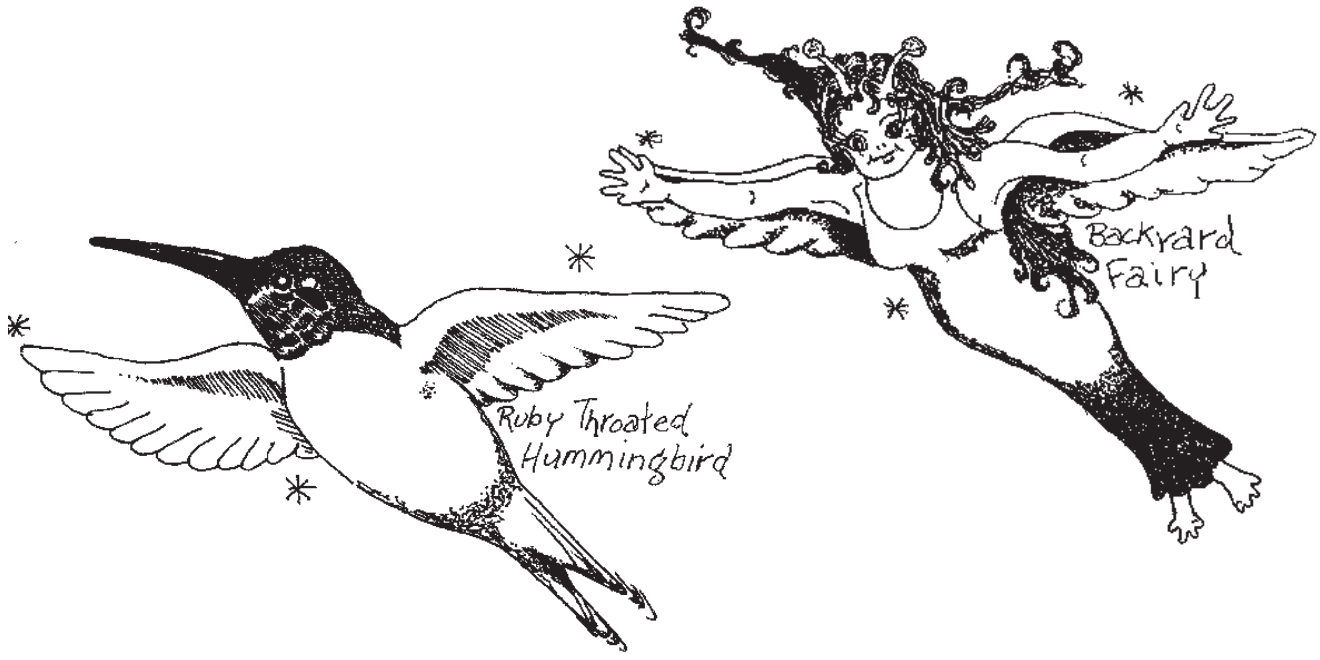
Have you ever seen a real fairy? One with tiny gossamer wings and a gown that changes colors with the sunlight? You can attract one to your garden and watch her as she sips nectar from your flowers and then builds her home with thistledown, lichens, and spider silk. If you are very still, she might light for a moment on a branch that you hold. These fairies have magical names like Calliope, Ruby Throat, Black Chin, and Rivoli.

They can fly straight up and down, or in a square, or even backwards. For meals, they enjoy gnats and spiders, with flower nectar for dessert. In fact, they eat so many meals a day, that if you tried to keep up with them, bug for bug, you would have to eat 300,000 calories (about 2,500 chocolate fudge cookies) a day! After an exhausting day of hunting and eating —they beat their wings 50 to 80 times *per second* and can fly as fast as 50 miles an hour—these enchanted creatures gently light on a pine twig and fall into a sleep so deep that they actually hibernate!

Attracting fairies

If you decide to try and attract them to your back yard, beware! If the fairy feeder is empty, these little imps might drive you crazy by fearlessly taunting you until you fill it up again. There are two ways to attract the fairies to your yard or window sill. The first way is the prettiest: Simply plant lots of bright red and pink flowers. Flowers with tubes are their favorites, like trumpet vine, salvia, and columbine. Others could be red zinnias, four-o'clocks, nasturtiums, and poppies. This combination might also attract bright, colorful butterflies to enhance the presence of the fairies.

The second way to attract these woodland nymphs is to create a small cafe for them and to place it in the branches of a tree. Here are the instructions for making an environmentally correct fairy feeder. (Would they want any other kind?) You can use recycled materials for this feeder.



Cut out the picture of the ruby-throated hummingbird and place it over the backyard fairy to discover the true identity of your visitors!

• Get a green plastic soft drink bottle whose contents you have enjoyed.

• Take the top off of a small bottle of dishwashing liquid. Clean it thoroughly and screw it onto the top of the pop bottle, leaving the spout in an opened position.

• Cut a circle about three inches in diameter from an old piece of red cloth (a red bandanna would be fine) and pierce the middle of it, then slip it over the spout and secure it with a rubber band.

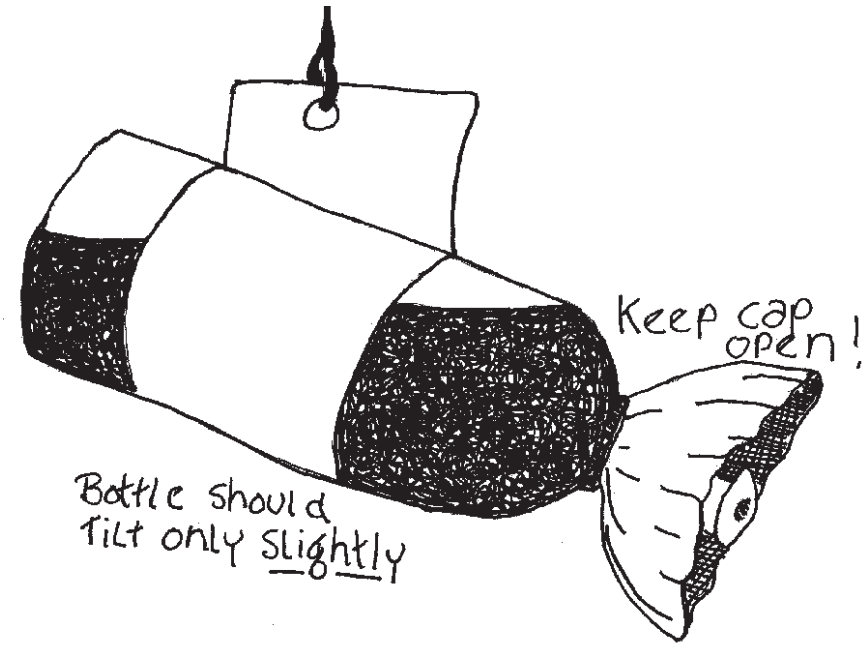
• Check out the tool room and find a roll of duct tape. (It's probably fallen behind the shelf, so scrape around under there with a yardstick.) Wrap a piece of duct tape around the bottle just a tad below the center of the bottle, leaving enough extra tape to form a sort of handle (see picture).

• Punch a hole in the top of the handle just a bit off center, toward the rear.

• Thread a stout piece of string through the hole. Make the string as long as you will need to hang your feeder from a branch.

• Now fill your feeder with fairy bait (recipe below) and check a couple of times a week to see that it stays full.

This gizmo should attract fairies to your yard within three or four weeks, but it only works during the summer months, as they tend to move south during colder weather.



Fairy bait

Have a grown-up help you to boil four cups of water, add two cups of sugar, and stir it until it is dissolved. Fill your bottle to the tip top with the cooled solution and save the rest in the refrigerator.

Have fun with the summertime visitors that you will attract, and if you are lucky, perhaps they will hatch some babies in your yard! (Did you know that fairies came in eggs?)

Some tricks to know

If you would like to hold a fairy (or any type of bird) on a stick, you must be very patient. First make sure that a feeder is being used by the type of creature that you want to attract, then find a long branch that's not too heavy for you to hold for a long time. Now drape yourself in a sheet so that none of your body shows. (Make a peep hole to look out, though.) Hold the branch very still while you sit beneath the feeder. If you have patience, your efforts will pay off with the visit of a woodland friend. This trick works especially well with black capped chickadees, and they like sunflower seeds a whole lot.

There are other creatures to attract to your home. These come out at night, and just can't resist a plate with attractively-arranged dinner leftovers. Try leaving a dish of goodies out, then dust around the plate with flour or corn meal. Check in the morning for footprints left in the flour. Can you guess who your visitor was by the tracks left behind?

Another great way to catch footprints is (with adult permission) to set a small dish of goodies in the center of a cooking tray that has been filled about halfway full with water-based paint or food coloring. Put this on your porch or deck, and wait to see if it is decorated with tiny footprints in the morning! Δ

Good-bye old friend

By Lucy Shober

Big Poney died today. He was 34 years old and had been going down pretty rapidly over this hot, dry summer. His bones seemed to poke out at every joint, and as much as I could feed him it never really made a difference.

He had been missing all morning. Following a storm last night, this was the first real day of crisp weather. Something seemed different about the way Poney was missing. Butterball, our other horse, seemed nonchalant enough, but he rarely left the side of his massive partner, and this morning he grazed alone. When I found Poney, my heart sank. He had lodged himself between two trees, and had obviously fallen, then struggled to get up all night . . . through the storm. He was mostly deaf, but when I yelled his name, he let out a deep, scared kind of whinny, and lifted his head. "Oh God, Pone, I'm so sorry . . . Oh, this isn't the way you were supposed to go . . ." He reached for my hand with his sweet old muzz1e. His nubby teeth showed as he stretched his neck.

I phoned Charley, our neighbor, who it seems is always handy to help with the little dirty things that come up on a farm. "Charley," I started out in my strongest voice, "John's at work, and Poney is trying to die, and I can't use a gun. I've got a big favor to ask . . . ." Then of course I dissolved.

The first time we saw him was when, as a 25-year-old, Poney (whose official name was Rasputin) came to live with us. He had been a jumper for most of his life, then a school horse. His owner had figured that he would be dying soon, and wanted him to live out the year or two he had left in peace and quiet. He was a Frenchman. He ran a tight ship with his horses, you could tell by the way he walked with a click. John and I could hardly understand his speech, but just did a lot of nodding and smiling as he handed over the reins to this sixteen hands of solid horse. Our first horse.

I laugh when I remember that first evening, and the silhouette of John and Poney cutting a line first across one pasture, then another. We had to ride bareback, for the lack of a saddle. John was really flying. My heart swelled with pride, and when they finally returned, I ran to greet them. "When did you learn to ride so well? That was beautiful!" Poney was huffing, and John looked half dead. "What the heck are you talking about?" he almost swore at me. "I couldn't get off! That son of a gun has a mind of his own!"

It's true, Poney did have a mind of his own, but he used it well. He was a school horse, and after he had schooled us on how he was to be treated, his big-hearted gentle nature couldn't help but show through. When we rode him, we always seemed to follow *his* orders, going at his pace and in the direction he chose. If he decided to take a swim, we had to swim, too. If he wanted to take a path filled with briars, so did we, by golly. If on occasion we happened to slide off his unsaddled girth and end up on the ground, he would be right there sniffing to see if everything was OK, awaiting a remount.

On one occasion—a "Fairy Party" thrown by our three year old daughter Wren—he stood patiently while his hooves were painted purple and flowers were woven into his mane and tail. He even submitted to sporting a flowered red sheet and unicorn horn for the day. He knew when to behave. He would shuffle behind as fairy after fairy sat upon his massive back for a magic ride.

Those were warm days, those days of clip clopping along with the baby "June bug" riding contentedly in my lap, the deep comfortable smell of that big old horse wafting back to us. That seems like a long time ago today. The "baby" goes to school now, and he has a new baby brother. Wren lost a hard battle with leukemia, but spent long hospital hours weaving fantastical stories about "What Big Poney is probably doing right now."

It seems that in our family, we keep time by the animals we have known and loved and said good-bye to. Big Poney's death marks the end of an era. Our young era. Older isn't bad though, just more knowing and even a little more glowing. I like it, but I sure will miss that big black horse. So will his young hot blooded partner Butterball.

When Charley came, Butter was grazing quietly. I had locked him into another pasture. After the shot, all was silent. I thanked my good neighbor and we turned to leave when a shrill scream and then another tore out of Butterball. He raced across the field as if he had suddenly gone berserk. Back and forth along the fence line he just flew and kicked. I don't know how he knew, he couldn't even see the woods where Poney lay. But he knew, and he wanted to be with him. Clods of dirt hit my face as Butter rounded the corner into the opened gate. He stopped short, then quietly stepped up to his friend. He bit him sort of softly on the shoulder and made a gentle snorting sound. He's been down in the woods beside Poney for several hours now. I guess I'll let him stay all day. Somehow it doesn't seem like I have much right to intrude on what's going on with them there. Δ

Seventeen great tips for caring for windows, mirrors, and other household glass

By Sandy Lindsey

1 To make windows and mirrors sparkle, dip a clean cloth in a 50/50 mixture of borax and water or denatured alcohol and wipe down. Polish with a lint-free rag or paper towel.

2 To achieve the highest shine and clearest view on windows and other glass surfaces, after washing and drying thoroughly, wipe them down with a clean, dry blackboard eraser.

3 To clean windows that you've put off for so long that they're now absolutely filthy and completely daunting, add three Tablespoons of clear ammonia (not sudsy ammonia, which will leave streaks) or three Tablespoons of vinegar to a small bucket of cool water. (*Note: Do not use both ammonia and vinegar*, as they will neutralize each other)

4 For particularly hard spots, use full-strength rubbing alcohol or mineral spirits, a clean rag, and some elbow grease.

5 To make cleaning small window panes easier, cut a squeegee to the exact window size. First remove the rubber blade, then use a saw to trim the metal blade holder. A pair of good scissors or garden snips should be all that's needed to cut the rubber blade to match. For streak-free cleaning, run the squeegee across the top of the window pane, wipe the blade, then run the squeegee in downward strokes starting at the bottom of the horizontal line just squeegeed. Use overlapping strokes to eliminate water lines at the edges.

6 Another way to make window cleaning quicker and easier is to use an old 100% cotton sweatsock on both hands. Wash with one hand, dry with the other.

7 To get accumulated grit out of window edges and corners, use a Q-tip dipped in vinegar. Rinse thoroughly afterwards.

8 To keep frost from accumulating on exterior windows during the winter, add two cups of antifreeze or rubbing alcohol to each gallon of wash water.

9 If your last house painting left tiny paint flakes on your windows, saturate the paint spots with a cloth dipped in vinegar to soften the dried paint. Scrape off with an ice scraper, or if necessary with a razor blade.

10 If hard water leaves a cloudy film on your windows and drinking glasses, rub the glass down with warm vinegar to loosen the film buildup, then wash with bottled or filtered water. This works equally well with windows that have a build-up from dirty rain water.

11 Tape a reflective vinyl coating to the inside of windows to protect interior furnishings and curtains from the harsh effects of the sun. It will also help keep a warm room cooler and more pleasant to use.

12 To cover clear bathroom windows from prying eyes, mix four Tablespoons of Epsom salts in 1/2 pint of flat beer, and paint on with a brush to create temporarily opaque windows. To remove, wash with borax and water as suggested in #1.

13 Use a vacuum cleaner to periodically clean dirty window screens while they're still in place to save yourself the trouble of removing and replacing them for washing.

14 To make metal window screens last longer, paint them yearly with a light coating of spar varnish.

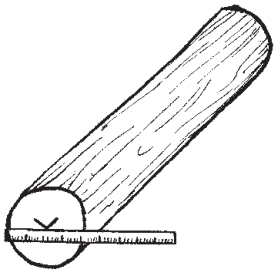
15 To keep aluminum window screens clean, remove them every few months and scrub down both sides with a rag dipped in kerosene. Wipe off the excess and allow to dry. The remaining kerosene will act as a rust inhibitor. **Warning: Work with kerosene only in a well-ventilated area away from open flame.**

16 The quickest way to repair a small hole in a window screen (whether metal or fiberglass) is to push the weave back together and seal with clear nail polish, to keep out small bugs.

17 To repair a larger hole in a fiberglass screen, remove the screen and lay it down flat in a work area. Lay a sheet of aluminum foil beneath the hole in the screen. Place a fiberglass patch over the hole, and lay another piece of aluminum foil over the spot. Run a hot iron around the edges of the patch. The heat will fuse the old fiberglass screen with the new. Remove the foil and reinstall. Δ

Here's an easier (and cheaper) way to make wooden beams

By Rev. J.D. Hooker



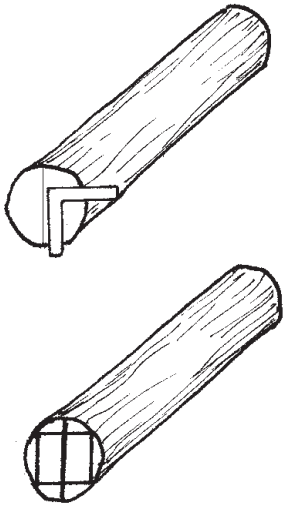
1. Find and mark the center of each log end.

I know that there are a lot of really fine products available for turning logs into lumber, from bandsaw sawmills to chainsaw attachments. I've seen a lot of these at work, too, and most of them are actually terrific pieces of equipment, if you're interested in producing a large quantity of dimensional lumber. However, if you're really only in need of a few good squared beams, then those gadgets become more of a waste of your hard-earned dollars—and time wasters to boot—than any sort of worthwhile investment.

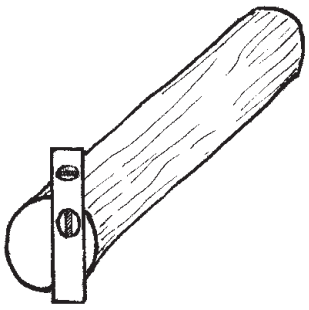
Most of the older barns you'll find still standing—and most other post-and-beam-type buildings—were put up without the aid of any such machines. I wouldn't advocate the idea of producing all of those beams and timbers using only hand-powered equipment, like those old-time builders had to. But if you're already the owner of a chainsaw (which is probably how you'd obtain all the logs to start with), I can't see where purchasing a mill would speed up your production of beams or timbers at all.

Producing timbers and beams from logs is a pretty simple and straightforward process. Once you've completed your first beam, you'll have it all down pat. In fact, you'll be something of an expert after only three or four. You can see how it's done by looking at the drawings in this article.

Splitting away the waste slabs from the outside of the log is just a little easier if you can find one of those old-style



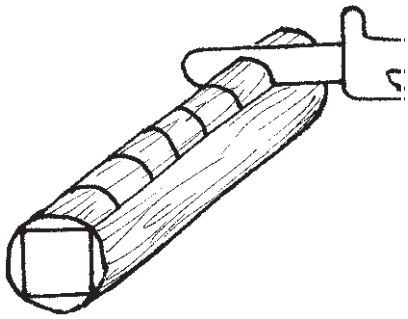
3. Use a square to mark the dimensions of the beam at each end.



2. Use a level to mark a vertical baseline at each end of the log.

hewing axes, the kind they used to fashion the original hand-hewn barn beams. If you can't locate one, don't worry about it; any axe will do almost as well. Normally I use my old double-bit axe, but truthfully I'd recommend using a single-bitted axe, for safety, unless you're already something of an expert with a double bit.

I didn't say this would make for an easy job but, on the other hand, using even the most expensive of the mills

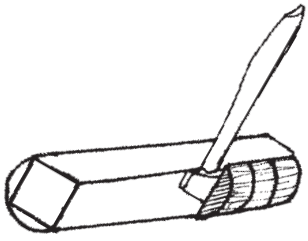


5. Saw notches down to the chalklines, six to eight inches apart, using a chain saw.

for this task is no easy job, either. I'd put it at a tie, as far as the hardness of the work. For the speed of producing usable timbers, this method has a slight edge on the machines. For economic considerations, though, this method is the hands-down winner.

From what I've seen, the readership of this magazine is mostly made up of pretty intelligent folks, most of whom aren't afraid of hard work (as long as it's productive hard work), and who are frugal enough not to toss away their hard-won income on gadgets or equipment they don't really require.

So, if you should be considering any use for beams or timbers—whether you might be contemplating a full-scale post-and-beam house or barn, or only enough 4x4s and 4x6s for a small pole building—why not try following these simple illustrated instructions for producing your own timbers, using tools you already probably own. Try it out before opting for the cash outlay involved in purchasing one of the mills to do the job. I'm sure you'll be satisfied with the results. Δ



6. Split off the waste pieces with an axe or a maul.

You can grow gourmet strawberries from seed

By Diana W. Morgan

I was raised by parents who had lived through the Depression as young adults. Recycling, conserving, and being frugal was a way of life for them. My father always had some sort of garden, even when he had little time to tend one. Being a baby boomer, I have more environmental awareness than my dad and tend towards organic gardening, but his pinch-penny ways rubbed off.

My father never raised plants from seed, saying he couldn't because he didn't have a greenhouse. When I inherited his four-story house with a southern exposure and lots of windows, I couldn't understand why he never tried starting his own plants. A couple of trips to the local nursery quickly convinced me that buying plants was not the way to go, cost-wise.

My husband built me a potting bench out of scrap lumber and left-over vinyl floor covering, and I began starting bedding plants from seed. I kept to the easy stuff at first, like tomatoes and marigolds, but soon got adventuresome. Now I start several hundred plants, both annuals and perennials, from seed each year. I buy potting soil from my local nurseryman instead of plants.

When my husband expressed a desire a few years ago to start a strawberry bed, I began to price bare-root plants. The price made me gasp. I love strawberries, but I am too tight to pay about $100 for those plants. My husband pointed out that we paid about a fourth of that each year to pick-your-own growers. If we wanted our own strawberries, we were just going to have to buy expensive plants.

Alpine strawberries

I was cruising the seed catalogues, trying to find the most reasonable price on plants, when one small entry for a single variety of alpine strawberry caught my eye. Alpine strawberries are derived from the wild ancestors of modern cultivars. The fruits are smaller than commercial berries, but much larger than the wild ones. The flavor of these berries is intensely strawberry. The plants are everbearing and do not produce runners, making them ideal for container growing. Most plants will bear a small crop the first season if started in mid-winter.

Start alpine strawberry seeds 12 to 16 weeks before the last frost. Use a good grade of moist commercial potting soil, or a home-made mix if you prefer. Sprinkle the seed sparingly on top, cover with an additional quarter inch of potting soil, and firm gently to assure contact with the soil. Keep the seeds moist, but not wet. Plastic covers can help regulate the moisture content, or set a six-cell pack inside a recycled clear plastic bag and loosely knot the bag. I like to use multi-celled growing trays with a cell diameter of at least 2 1/2 inches. This gives each plant room enough to grow and avoids transplanting to a larger pot, reducing the risk of transplant shock. It will take two to three weeks for the seeds to germinate, so be patient. Give them plenty of light and not much heat. Alpine strawberry seeds germinate best at temperatures near 65°F (18°C) and about nil at 75°F (24°C) or higher.

When the seedlings emerge, remove the plastic covering and thin them to one plant per cell. The easiest way to do this is to take a pair of scissors and snip off all but the strongest plant.

However, I just can't bear to waste a plant. I transplant the extras into moist potting soil in new containers. Strawberry seedlings are fragile, with spindly stems, so wait until the plants have developed at least four leaves. Then they should be sturdy enough to handle. Fill the new containers with moist potting soil and make a hole in the soil using a pencil or similar object. Be sure the hole is deep enough to accommodate the plant's roots. Take an old plastic picnic fork and break off all but the two center tines. Grasp the seedling by a top leaf and, using the plastic fork, gently pry out the plant. Be sure to dig deep enough with the fork to get the whole root. I usually go right to the bottom of the container. It is all right to get fairly close to the plant stem. The root system isn't very bushy at this stage of growth. Pop the seedling into its ready-made hole and firm gently in around it. The plant should be set at the same depth it was growing in the old pot. Sometimes seedlings are growing too close together to be separated safely. In that case, snip off the extra plants with scissors. The loss can't be helped.

When your strawberry plants are ready to set out, after the last frost, harden them off for a few days. This entails setting them outside in a warm, sheltered area for a few hours

each day. Start with a half hour and increase the time they're outside by an hour every day. This will allow the plants to become accustomed to sun and wind, and the outdoors in general. Once they are hardened off, in about three to four days, plant them in a sunny location at the same depth as they were growing in the pots. Strawberries have crowns where the leaves and fruiting stalks emerge. If the plant is set at a depth below this crown, it will not bear fruit.

Alpine strawberries do not tolerate heat well at all, so choose their permanent location carefully. I learned this the hard way. I lost 2/3 of my first year's crop because I treated them like commercial strawberries and gave them strong sun and a southern exposure. The only plants to survive were some that were shaded for the hottest part of the day. A northern or eastern exposure with full sun is best. Barring that, give them partial shade in the afternoon. Remember, they are *alpine* strawberries: their ancestors grew at high, cool elevations.

They also like plenty of rich organic matter and plenty of moisture. Mulching with straw will help retain moisture and keep the roots cool. Pinch back the first set of blooms in the spring. Hard as this is to do, it allows the plant to get strong by putting its energy into making roots and leaves rather than fruit. Never fear, these are everbearing plants, so some fruit will come along later in the season. If you live where the winters are frigid, protect the plants with a deep mulch; but be sure to remove it as soon as the snow melts in the spring.

There are several varieties of alpine strawberry seed on the market:

- **Temptation** is a hardy type with good-sized fruit, and does well in hanging baskets.
- **Reugen** is a very hardy variety that produces compact plants and small, elongated fruit.
- **Baron Solemacher** produces 1 1/2" berries on compact plants.
- **Alexandria** is similar to Reugen and is the first variety I grew. The berries are small, barely larger than wild ones, but are very sweet and intensely flavored.

In 1996, for the first time I've seen anywhere, W. Altee Burpee & Co. is offering seed for a strawberry that is not an alpine variety. The strain is called "Picnic," and according to the catalog, is everbearing, producing medium-sized fruit and a few short runners. The seed for these berries is rather pricey, about 2 1/2 times the cost of alpine strawberry seed. The larger-sized fruit may be worth the price of seed, however. I've found germination to be about equal to the alpines.

Even if you haven't much room, growing your own strawberry plants from seed can be rewarding. Just a few plants in a hanging basket outside the door will provide berries for your morning cereal. The dainty plants are a joy to look at and the fruit is well worth the effort of starting them from seed.

Seed sources

All these catalogues are free:

Johnny's Selected Seeds
Foss Hill Road
Albion, ME, 04910-9731

Thompson & Morgan
P O Box 1308
Jackson, NJ 08527

Pinetree Garden Seeds
Box 300
New Gloucester, ME 04260

Vesey's Seeds
P O Box 9000
Calais, ME, 04619-6102

W. Altee Burpee & Co.
Warminster, PA 18974 Δ

These salads are hearty dishes

By Jennifer Stein Barker

When most people think of a salad, they first think of lettuce or fruit, but a salad may also be made of vegetables or fruit, combined with other foods like meat or grains, dressed with a savory sauce, and served cold.

These hearty carbohydrate-based salads will complement a meal that might otherwise be light on protein. They make good dishes to take to potlucks (where you never know if everyone else will bring snacks and desserts). They also make a great lunchbox addition when packaged in a small container and tucked in with a fork and napkin.

Curried rice salad

Cook the rice any time and stick it in the fridge. Then make this salad ahead for a carefree meal. This serves four as a main dish.

- 1 3/4 cups raw brown rice
- 1/3 cup finely diced dried apricots
- 1/2 cup raw cashews, toasted
- 2 cups bok choi, sliced

Dressing:

- 1/2 cup mayonnaise
- 2/3 cup yogurt
- 2 1/2 teaspoons curry powder
- 2 cloves garlic, minced
- 1 teaspoon minced fresh ginger root
- Pinch cayenne pepper

To toast cashews, spread the nuts on a pie plate or cookie sheet. Toast in a preheated 350° oven for 5-10 minutes, until lightly golden.

Cook the rice with 3 1/2 cups water for 45 minutes. **Do not stir.** When the rice is done, cool in the refrigerator until well-chilled before proceeding with the rest of the recipe.

Put the apricots, cashews, and greens in a large bowl with the rice. Mix the dressing ingredients in a small bowl, and pour over the rice in the large bowl. Toss all well to combine. Chill at least two hours before serving. This keeps well for two or three days.

For an elegant presentation, save out the prettiest bok choi leaves, and use a higher proportion of stems in the salad. Dress the leaves lightly with oil and vinegar, and arrange them on a shallow dish or platter with the rice salad on top of them.

Black-eyed peas with mustard dressing

A simple bean salad. Serve with lots of home-made bread.

- 1 1/2 cups uncooked black-eyed peas
- 3 green onions, sliced thinly
- 1 cup sliced celery stalk
- Sliced olives for garnish (optional)

Dressing:

- 1/3 cup olive oil
- 1 teaspoon lemon juice
- 1 clove garlic, minced
- 2 Tablespoons cider vinegar
- 1 teaspoon Dijon mustard
- 1 teaspoon tamari soy sauce
- Freshly ground black pepper

Cook the black-eyed peas in plenty of boiling water until tender, about 20 minutes. Drain well. Put the warm peas to soak in the dressing for 30 minutes, then add the green onions and sliced celery. Chill well. Serve on a bed of lettuce, garnished with sliced olives.

Ranch potato salad

A hearty western-style potato salad. Serves six as a side dish.

2 lbs. waxy potatoes
1/3 cup diced cucumber
1/3 cup diced celery
1/4 cup coarsely grated carrot
1/4 cup sliced black olives
A few olives for garnish
3/4 cup creamy herb dressing (the recipe is below)

Scrub the potatoes, and peel if desired. (I leave the peel on for more flavor.) Steam them in a steamer basket, or boil if preferred, until tender. Chill the potatoes thoroughly before combining with other ingredients.

Prepare the creamy herb dressing, using two cloves of garlic. Combine the potatoes, cucumber, celery, carrot, olives, and 3/4 cup dressing in a bowl. Toss to coat ingredients with dressing. Taste, and adjust amount of dressing or add salt if desired.

Creamy herb dressing

A homemade version of the thick buttermilk-and-herb dressing that is far better than store-bought. This recipe makes one cup of dressing.

1/2 cup yogurt
1/2 cup mayonnaise
1 teaspoon honey
1 or 2 cloves garlic (to taste), pressed
2 teaspoons finely chopped fresh basil
2 teaspoons finely chopped fresh oregano
2 teaspoons finely chopped fresh thyme or lemon thyme
(If you don't have fresh herbs, use approximately 3/4 teaspoon dry herb for each kind.)

In a small bowl or 2-cup measure, whisk all ingredients together until well-blended. Transfer to a glass jar for storage. Chill at least an hour before using.

Oriental bulgur salad

This quick and delicious salad is a standard around our house for taking to potlucks. Use tender young bok choi or mild mustard greens. Serves four as a main dish.

2 cups bulgur wheat
2 cups sliced bok choi or greens
1 clove garlic, minced
2 green onions, sliced thin
1/2 cup cilantro leaves
1 teaspoon ginger root, minced finely
1/4 cup dark sesame oil
1/4 cup tamari
2 Tablespoons balsamic vinegar
1 1/2 teaspoons honey
1/4 teaspoon Tabasco
Toasted cashews as garnish

In a large bowl, cover the bulgur with boiling water and let soak 20 minutes. Taste, and if it has soaked up all the water and is still not tender, add a little more boiling water and let soak until tender. If the water will not all soak in, but remains on the bottom of the bowl, you will have to drain the bulgur in a sieve. Let cool to room temperature.

Dice the leafy part of the greens into coarse pieces, and slice the tender parts of the stems finely. Put the greens in the bowl with the bulgur. Prepare the garlic, green onions, cilantro leaves, and ginger root, and add them to the bowl.

Sauce: Combine the sesame oil, tamari, balsamic vinegar, honey, and Tabasco. Whisk well, and pour it over the bulgur and vegetables. Stir to combine thoroughly. Chill before serving. Δ